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M E M O I R S

RELATIVE TO

E G Y P T,

WRITTEN IN THAT COUNTRY DURING THE

CAMPAIGNS

OF

GENERAL BONAPARTE,

In the Years 1798 and 1799,

BY

THE LEARNED AND SCIENTIFIC MEN

WHO ACCOMPANIED

THE FRENCH EXPEDITION.

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1800.

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ADVERTISEMENT
OF THE
TRANSLATOR.

WHEN the ever-memorable expedition of the French against Egypt was committed to the care of GENERAL BONAPARTE, it is well known that he persuaded a number of men of learning and science to accompany him, many of whom had been eminent in France for their talents and industry.

The Work which is here presented to the Public is a faithful translation of the Memoirs and Observations of those persons. It consists of a number of papers on various topics, which were brought from Egypt by General Bonaparte, presented by him to the National Institute, and lately selected, arranged, and published by that learned and distinguished Body.

The reader will naturally expect to find considerable information concerning the manners, customs, arts, and natural productions of the curious and interesting country to which these papers relate. In this expectation, he will not be disappointed. Allowing for the great difficulties which attend the collecting of scientific information in a country where every progress was made in a hostile manner, and which, though so much celebrated in history,

has

has long been in a state of very imperfect civilization, these scientific Memoirs will be found to contain a variety of matter highly interesting to the lovers of philosophical knowledge, and which will materially assist the labours of those who may choose to examine into the characteristic distinctions of the singular people who occupy this remarkable portion of the globe.

Some of the Memoirs bear the marks of being hastily composed, but these form by no means a large portion of the present Work ; and as it is understood that the French original is a selection of the Memoirs which were judged the most worthy of publication, no omissions or alterations have been made by the English Editor, which might render the translation any thing else than an accurate and complete copy of the original Work.

*London,
March 31st, 1800.*

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N. B. The notes signed (L—s) are by Citizen Langles, Member of the National Institute of France, and Keeper of the Original Manuscripts in the National Library.

 The Binder is requested to place the Chart of the Lake of Menzaleh opposite the Title, and the Map of the Natron Lakes opposite page 270.

MEMOIRS

RELATIVE TO

E G Y P T.

FORMATION OF THE INSTITUTE OF EGYPT.

BONAPARTE, the commander in chief, by a special order, dated the 3d Fructidor, 6th year (20th August, 1798), enjoined, that an Institute should be formed at Cairo, for the cultivation of Arts and Sciences. It is intended that this establishment shall be principally occupied :

- 1^o. With the propagation and progress of knowledge throughout Egypt; and
- 2^o. With an enquiry into, the study, and the communication of natural, economical, and historical facts relative to that country.

The Egyptian Institute is divided into four sections, which are those of Mathematics, Natural Philosophy, Literature and the Fine Arts, and Political Economy. Each section is composed of twelve members; that of Mathematics, is the only one at present complete. There are two places vacant in the department of Natural

B

Philosophy;

Philosophy; six in that of Political Economy; and four in that of Literature and the Fine Arts.

Lists of Members of the Institute.

MATHEMATICS.

Andreoffi,	Leroi,
Bonaparte,	Malus,
Costaz,	Monge,
Fourier,	Nouet,
Girard,	Quesnay,
Le Pere,	Say.*

NATURAL PHILOSOPHY.

Berthollet;	Desgenettes,
Champy,	Dolomieu,
Conté,	Dubois,†
Delille,	Geoffroy,
Descotils,	Savigny.

POLITICAL ECONOMY.

Caffarelli,‡	Shulkouski,
Gloutier,	Sucy,§
Poussielgue,	Tallien.

* He was succeeded by the Citizen Lancret.

† He has retired, and is succeeded by the citizen Larrey.

‡ Replaced by the citizen Corancez.

§ Retired, and replaced by the citizen Fauvelet Bourrienne.

LITERATURE AND THE ARTS.

Denon,	D. Raphael,
Dutertre;	Redouté,
Norry,	Rigel,
Parseval,	Venture.*

SUMMARY OF THE PROCEEDINGS AND LABOURS OF THE INSTITUTE.

The Institute of Egypt met for the first time on the 6th Fructidor (23d August); it will continue to assemble on the *primidi* and *sextidi* (first and sixth days) of every decade. Citizen Monge was elected President, and citizen Bonaparte, Vice-president, for the ensuing quarter; citizen Fourier was nominated perpetual Secretary.

Citizen Bonaparte then proposed the following questions :

1^o. Are the ovens employed in baking bread for the army, susceptible of any improvements, in regard to the expenditure of fuel, and in what do these improvements consist? The examination of this question was referred to a committee composed of the citizens Berthollet, Caffarelli, Monge, and Say.

* Replaced by citizen Ripault.

2°. Are there any indigenous means of substituting another ingredient instead of hops, in the beer made in Egypt? Referred to a committee composed of the citizens Berthollet, Costaz, Desgenettes, and Gloutier.

3°. What are the modes usually employed for clarifying and dulcifying the waters of the Nile? Referred to a committee composed of the citizens Berthollet, Costaz, Monge, and Venture.

4°. Considering the present state of affairs at Cairo, which ought to be constructed, a wind or a water mill? Referred to a committee consisting of the citizens Andreoffy, Caffarelli, Costaz, Malus and Say.

5°. Does Egypt furnish resources for the fabrication of gunpowder, and what are those resources? Referred to a committee composed of the citizens Andreoffy, Berthollet, Malus, Monge, and Venture.

6°. What is the present state of jurisprudence, of the judicial order, both civil and criminal, and also of education in Egypt? What are the improvements that can be introduced into these branches, and are at the same time desired by the people of the country? The committee entrusted with collecting the necessary information on these various subjects, was composed of the citizens

citizens Costaz, Shulkouski, Suci, and Tallien. A committee, consisting of the citizens Caffarelli, Costaz, Geoffroy, Monge, and Tallien, was afterwards appointed: it was charged with proposing a plan of regulations for the Institute.

In the session of the 11th Fructidor, citizen Andreoffy delivered a report relative to the fabrication of gunpowder in Egypt, and Citizen Monge read a memoir on the optical phenomenon, called *mirage*,* by the French sailors.

A committee was afterwards appointed, to draw up comparative tables of the weights and measures of Egypt, and those of France: it was composed of the citizens Costaz, Geoffroy, and Malus. Another was enjoined to make preparations for facilitating the composition of an Arabian vocabulary, to enable the French to keep up the necessary communications with the inhabitants of Egypt: this consisted of the citizens, Desgenettes, Shulkouski, and Tallien.

The citizen Monge, on the 16th Fructidor, exhibited to the assembly a specimen of the stone with which the castle of Cairo had been built; it was cut out of the rock on which the fortifications now stand. This calcareous stone is com-

* This is usually denominated a *fog-bank* by the English navigators, and is very common in the warm latitudes. *Tr.*

posed of what is commonly called the *nummifical shell*, because it resembles little pieces of money. These shells split with great facility, if taken longitudinally ; within is found a very thin substance, disposed in a spiral form ; it serves as a lodging to the animal that forms it. A stone in every respect similar to this is found at Laon, the principal town of the department of the Aisne, where it has been employed in building. One would think that he saw the walls of that place, when he beholds the ruins of the castle of Cairo.

Citizen Berthollet read a memoir on the formation of ammoniac ; he explained the nature of the precipitate that results from the dissolution of tin, in consequence of the mixture of the muriatic with the nitric acid. This precipitate is not, as has been hitherto supposed, an indissoluble oxyd of tin, but a combination of tin, highly oxydated with the ammoniac. The tin, between which and oxygene there is a great affinity, decomposes the nitric acid and the water, and then the azote and hydrogene unite together to produce the ammoniac. The last substance combines with the oxyd of tin, and forms the precipitate we have just mentioned.

This explanation is supported by the following

ing experiments :—the ammoniac is withdrawn from this precipitate by the action of heat and the admixture of lime. The dissolution of tin in the muriatic acid, even when impregnated with the oxygenated muriatic acid, does not then afford any precipitate ; but this is formed the moment that a little ammoniac is poured in. The muriatic dissolution of tin, to which is added the oxygenated muriatic of potash, preserves it without being subject to turn thick, even when it is exposed to heat.

It is highly important in the art of dying to be able to keep the dissolution of tin without its either getting foul, or the oxyd of tin settling at the bottom, by means of precipitation. It has been proposed that it should be prepared with the muriatic acid alone, and that the dyer should impregnate it with the oxygenated muriatic acid during each operation ; but, instead of this embarrassing impregnation, which is attended with great uncertainty in respect to the proportions, citizen Berthollet proposes to add a determinate quantity of the oxygenated muriatic of potash, by means of which, tin highly oxydated, ceases to solicit the decomposition of water, and consequently the formation of ammoniac ; so that the dissolution is thus preserved in an uniform state.

He announces, that several other metallic precipitates are also indebted for their distinctive properties, to the ammoniac which has formed itself, and remains in combination with them.

In the session of the 21st Fructidor, citizen Shulkouski informed his colleagues, that he had observed a bust of Isis on the banks of the Nile, near Feranéh, and two stones inscribed with hieroglyphics in a garden of the same village; he requested that they might be transported to Cairo, and placed within the buildings occupied by the Institute.

Citizen Say read a note containing the result of a comparative experiment with wood, reed, and the stalk of the carthamus (*carthamus tinctorius*, Lin.) for the purpose of heating ovens. This note also exhibited the advantages and disadvantages of each of these three combustibles, as well in respect to the duration, as to the degree of heat produced by the consumption of a determinate quantity.

The committee for perfecting the grinding of corn, informed the assembly that the arrival of several mechanics attached to the commission of arts, would facilitate the construction of a wind-mill.

Citizen Geoffroy read a memoir on the wing of
the

the ostrich, and citizen Beauchamp was nominated a member of the Institute in the section of Natural History.

On the 26th Fructidor, citizen Say, in the name of a committee, presented a report relative to the most advantageous species of fuel for the ovens of the army, and also on the means of lessening its consumption. It results from this, that the stalks of the carthamus, reeds, and the straw of Indian corn, can furnish a sufficient quantity of combustibles for the ovens, and that too at a less price than in France; the difference may be estimated at 20 *per cent.* The construction of the ovens, care in the manner of heating them, and the rapid succession of batches, will diminish the quantum required; in addition to these means, new ovens may be built, in which the current of air shall be more rapid than in those now in use.

Citizen Bonaparte laid on the table a copy of "the Meteorological Register for the 7th year;" he at the same time invited the Institute to take the necessary measures for drawing up an almanack. The citizens Beauchamp, Monge, Nouet, and D. Raphael, were intrusted with the completion of it. This triple calendar is to comprehend the division of time, according to the

the different modes adopted by the French, the Cophts, and the Mussulmen.

Citizen Fourier read a memorial on the general resolution of algebraical equations.

Citizen Parseval recited a translation of a fragment of the seventeenth *canto* of Tasso.

The citizen Desgenettes addressed the assembly relative to the salubrity of Egypt; he began by enumerating the divisions of the year, according to Prosper Alpinus. That physician distinguishes four seasons occurring at different periods from those in Europe: the spring, which is composed of the months of January and February; the summer, which continues six months, and is divided into two distinct portions, of which March, April, and May, constitute the one, and June, July, and August, the other. The autumn, consists of September and October; the winter, of November and December. Citizen Desgenettes briefly enumerated the maladies peculiar to each of these seasons; he remarked that the army, during the last summer, had in general experienced only three diseases, the ophthalmia, the diarrhoea, and the dysentery, relative to which he delivered a number of observations which he means to publish. He assigns as the predominant cause of these maladies,

dies, especially the two last, the frequent changes of the atmosphere ; he has accordingly invariably directed towards this point, the advice given by him in the various orders of the day. Repeated observations have in fact demonstrated that in nearly all diseases, there is a general tendency to carry the humour which constitutes transpiration from within towards the surface ; that is to say, from the intestines to the skin. This remark shews with how much circumspection all violent or drastic purgatives ought to be avoided, and the advantages resulting from the employment of the *minoratives*, when evacuation, becomes necessary. The ancients have long since recommended slight purgatives, whenever there was any danger of diminishing the transpiration, and Sanctorius hath since demonstrated by his statical experiments, that the administration of these means, scarcely produces sensible evacuations. It has also been remarked, that mercurial preparations taken internally, and external frictions, even when methodically administered, far from producing salutary effects, have often proved greatly detrimental, in the treatment of venereal maladies, so that it became necessary to recur to sudorifics for a cure.

Citizen Desgenettes afterwards alluded to the
present

present medical epoch of the year, the passage from summer to autumn, being that which is the most critical in Europe ; but he thinks, that it may not perhaps prove equally deleterious in this climate, as the autumn is very short, and already announces itself as little else than a continuation of summer. The maladies to be dreaded in autumn, are fevers, especially intermittent ones ; and the latter, which are rather dangerous, are generally supposed to be indebted for their existence, to the neighbourhood of marshes ; but the rapid manner in which the Nile retreats, and that, by means of which the earth is all of a sudden covered with an abundant vegetation, ought to render us easy in regard to this particular : the soil we inhabit has no affinity whatever to a marsh.

The physician whose discourse we here analyze, concluded by a reference to that redoubtable malady, which already excites the solicitude of government, and announced, that notwithstanding his repeated enquiries, he was as yet unable to obtain a satisfactory history of it. He has however perceived, that in this country they generally confound all pestilential fevers which are exceedingly various, and form a genus of themselves, with the plague properly so called, which is a very circum-

circumscribed species. Future observations, must decide this question.

During the session of the first complimentary day, of the year 6, (September 17, 1798) Citizen Beauchamp presented an abridged calendar capable of being instantly printed for the use of the army. This contains both the old and new division of time.

Citizen Berthollet enumerated the modes practised at present in Egypt for the manufacture of indigo; they are extremely simple but imperfect. It will however be easy, by means of a few changes to improve the fabrication of this important production.

Citizen Fourier read the description of a machine, worked entirely by the wind, and capable of being employed for watering the ground. The wheel exposed to the action of this element is horizontal; all the other parts are stationary, and the sails so placed, that they always turn round in the same manner, whatever may be the direction of the current of air.

The members did not assemble, on the first *Vendemiaire*, 7th year; (September 22d, 1798) on account of the celebration of the festival in honor of the anniversary of the foundation of the Republic.

On

On the 6th, citizen Poussielgue presented a printed work by citizen Corancez, the title of which was, "A summary of a new method, for reducing the principal theorems of geometry, to a simple analytical process." The Institute gave orders, that this work should be deposited in its library.

Citizen Norry read a memoir on Pompey's column. In consequence of this paper, citizen Dolomieu deliveredd his opinion relative to the epoch of its erection, which according to him, ought to be referred to the age, that follows the reign of Constantine. The capital and pedestal, exhibit the marks of decay, visible in the architecture of those times; but the shaft must appertain to an anterior epoch, when this art flourished in all its purity.

Citizen Savigny read a memoir relative to a new species of *nymphæa*.

Citizen Dutertre presented a paper on the establishment of a public school for drawing. His proposition was referred to the examination of a committee, composed of the citizens Denon, Desgenettes, Norry, Redoute, Rigo, and Sucy.

Citizen Costaz read a memoir, in which he explained the variations of the colour of the sea.

Citizen Parseval recited a translation in verse,
of

of a fragment of the seventeenth canto of *Jerusalem Delivered*. On the 4th *Vendemaire*, the President made an offer in the name of General of Brigade Beliard, of twenty mummies of birds, preserved in pots of free-stone, sealed up. The examination was referred to a committee composed of the citizens Bonaparte, Desgenettes, Dolomieu, Dutertre, Geoffroy, and Sucy.

Citizen Porte, a Frenchman settled at Cairo before the arrival of the army, and who has been occupied ever since, about the cultivation and manufacture of indigo, presented a specimen of the produce. A committee composed of the citizens Berthollet, Costaz, and Descotels, was nominated to deliver in a report upon this subject.

A member of the Institute read a memoir on the ophthalmmy,* drawn up by Citizen Larrey.

The Citizen Beauchamp delivered a narrative of his voyage from Constantinople to Trebisond. It is well known that Bonne assigns a very different position to the Caspian Sea, from that which we find in Danville's maps. He, indeed, preserves the well-known situation of Astrakan; but by giving to the Black Sea a considerable extent from east to west, he brings forward the

* A disease of the eyes.

Caspian, and withdraws a remarkable portion of Asia towards the east. Citizen Beauchamp having already determined the longitude of Ispahan, thus discovered the error of Bonne, but it became still necessary to give an exact admeasurement of the length of the Black Sea, by ascertaining the situation of Trebisond, in respect to the meridian of Pera; this has also been accomplished by Citizen Beauchamp, on the recommendation of the board of longitude, and the question is now fully decided. The difference of longitude between Paris and Trebisond, is not 43° , as Bonne maintains, but $37^{\circ} 18' 5''$; which subtracts more than 80 leagues from the length of the Black Sea. This determination was obtained by the application of the marine time-keeper, the distances of the sun and moon, and the eclipses of the satellites of Jupiter. The author of the memoir has annexed an account of the difficulties experienced by him, in repairing by sea to Trebisond, which is no longer remarkable at present, than in consequence of our recollecting that it was once the abode of the Greek emperors.

Citizen Delille read a memoir on the palm-tree that produces the fruit called *dòmm*, (or *doùm*.) After the enumeration of the characters

common

common to the different *genera* of palm-trees, the author gave a minute description of the berry of the *dōmm*, and made it appear evident that this is precisely the same as what Theophrastus has denominated *cusiofera*. It is not a little remarkable, that Bauhin, Pococke the traveller, and Linnæus himself, who have mentioned the palm-tree of the Thebaid, have not recollected that the *dōmm* is the *cusī* of Theophrastus, although a figure of it be found in Dioscorides. It is the more important not to neglect these approximations, as it may be easily supposed that certain plants have experienced considerable changes, during an interval of several centuries; and we have here an opportunity to remark with what care the ancients described plants truly worthy of notice, or in other words, such as were useful.

Citizen Dolomieu insisted, in a memoir, on the necessity of combining with the study of ancient geography, a series of geological observations on the constitution of the soil, and the changes which may have been produced by time: he applied these remarks to the site of the ancient Alexandria, and he fixes it in the interval that separates two portions of a succession of little hills, the *nucleus* of which, is composed

of a sandy calcareous stone. Citizen Dolomieu attributes the alterations observed by him, to the encroachment of the sea, and the decay produced by it; to a progressive increase of soil, carried thither by the waves, added to the immense quantities of rubbish, which have accumulated there; so that it is now difficult to distinguish the ruins which appertain to the different epochs. He further observes, that the sea appears to have altered its level, and to have obtained an elevation of nearly two feet, since the time of the Ptolomeys: he proposes to make an attempt to develope this subject in a future memoir.

Citizen Norry, in the name of a committee, read a report on the establishment of a school of design: this report was approved of by the Institute, and is to be presented to the commander in chief.

Citizen Parseval continued the recital of a poetical translation of a fragment of the seventeenth *canto* of Tasso.

On the 16th *Vendemaire* (October 7th) the general of division Berthier, chief of the general staff of the army of Egypt, transmitted to the Institute a plan of Egypt, according to its new divisions.

A letter

A letter was read from citizen Dubois, professor of the school of medicine at Paris, in which he observed that a violent malady rendered him incapable of remaining any longer in Egypt, and thus deprived him of the satisfaction of participating in the labours of the Institute. The secretary was instructed to notify to citizen Dubois, in the name of all the members of the Institute, the regret occasioned by this separation.

Citizen Nouet read a memorial, containing the result of the observations made by him at Alexandria, with the view of determining the geographical position of that city, and also the direction of the magnetic needle.

Citizen Dolomieu stated to the Institute, the precautions and discernment, which appeared to him necessary, in respect to the choice, the preservation, and the removal of ancient monuments. A committee, was in consequence of this, appointed to collect all the objects of antiquity which could be procured, distinguishing such as local interest might render worthy of selection, from those that could not be removed without inconvenience. The committee was composed of the citizens Caffarelli, Desgenettes, Dolomieu, Dutertre, Norry and Sucy.

A memoir communicated by citizen Nectoux was read, in which he exposed the peculiar facility with which an establishment consecrated to agriculture, might be formed in Egypt. A committee was appointed to examine into this subject; it was at the same time instructed, to make the necessary dispositions for the melioration of the different species of produce, and to endeavour in particular, that this country should enjoy the advantages resulting from the multiplication of the cochineal. Citizens Berthollet, Costaz, Delille, Desgenettes, Gloutier, and Tallien, were the commissioners nominated on this occasion.

On the 21st *Vendemaire*, citizen Nouet, in the name of a committee, presented an almanack exhibiting the divisions of time, in conformity to the usage of the French, the Cophts, and the Turks.

Citizen Desgenettes, in the name of citizen Frank, physician in ordinary to the army, presented the two first volumes of a work written in Italian, and entitled: “*Biblioteca medica Browniana, publicata da Luigi Frank, Firenze, 1797.*” Citizen Desgenettes seized this occasion, to present a succinct exposition of the fundamental principles of Brown. While analysing his doctrine, of which he discovered evident traces in

* in the early periods of dogmatical medicine, he proved himself equally averse to the excessive enthusiasm of its sectarists, and the no less exaggerated declamations of its adversaries. On the whole, citizen Desgenettes took pleasure in praising the philosophical and extensive views of Brown, relative to the simplification of the *materia medica*, as well as the use of several energetical remedies, among which is opium.

The work in question is to be deposited in the library of the Institute.

Citizen Le Pere presented a copy of the plan of Alexandria; on a reduced scale: this plan which is in the ratio of a thousandth part of the various dimensions therein specified, was effected after uncommon labour, by the engineers of the department of roads and bridges, united to the officers of general engineers, and those dedicated to geography. The astronomers of the Institute, also concurred in this work, having connected the principal points by means of a series of triangles, and determined the latitude and longitude of the *minaret* of the castle where the lighthouse is situated.

An exact account of the soundings of the road and two ports, is continued at Alexandria; the progress of the alluvions and the state and force

of the winds, are also attended to. By a comparison of the results, a certain character of utility and precision will be given to all our plans for a maritime establishment.

Proper persons are also busied about the description of the subterraneous canals, which receive the waters of the Khalydje; an hydraulic plan of the city of the Arabs, will be thus obtained; the number of cisterns that have been preserved, may be estimated at 300, and a few years since, they furnished a sufficient supply of water for eighteen months.

Citizen Beauchamp invoked the attention of the Institute to several objects, tending either to augment the advantages resulting from the possession of Egypt, to contribute to the progress of the sciences, or to become useful by application to the purposes of life. He at the same time annexed a series of questions, and proposed to appoint different committees either to examine into, or solve them. The Institute, after discussing the subject, nominated the following:

1°. A committee, charged with collecting the most exact information as to the means of cultivating the vine in this country. It is also to point out such spots as are best adapted for that purpose. The citizens Delille, Dolomieu, Geof-
froy,

froy, Gloutier, and Savigny, were the commissaries selected on the occasion.

2°. The aqueduct that conveys the waters of the Nile as far as the citadel, has experienced a considerable deterioration; the advantage usually derived from it has suffered an interruption, and hitherto, the labours of more than one hundred and fifty oxen, furnish but an inconsiderable supply; it has been therefore proposed to offer a prize to the person, who shall present the best and most economical plan, for furnishing the citadel with water. A committee, composed of the citizens Caffarelli, Costaz, Fourier, Le Pere, Norry, and Say, shall be employed to draw up the *programma*.

3°. A committee of the citizens Delille, Geoffroy, Gloutier, Le Pere, Malus, and Norry, is to examine if the immense mass of ruins that seems to form a circle around Cairo, can be converted to any useful purpose.

4°. Citizen Bonaparte having recapitulated the advantages resulting from an observatory, and pointed out the means of accelerating such an establishment, it is proposed that the citizens Norry and Caffarelli be added to the astronomers of the Institute, in order to fix on a proper station. The report to be delivered at the next meeting.

5°. As the *megyas* or nilometer, may give rise to interesting enquiries relative to the two-fold object of ancient geography and public usage: it is therefore resolved that a committee be instructed to present an exact description of this monument; to detail the historical facts which it has given rise to, and to point out the changes it has experienced, distinguishing those which arise from the elevation of the bed of the river; it is to examine at the same time, whether machines that are capable of being moved by the current of the stream can be stationed there to advantage. The citizens Costaz, Dolomieu, Dutertre, Le Pere, Norry, and Tallien, are to compose the committee.

6°. It is proposed, as soon as possible, to commence an uninterrupted series of thermometrical and hygrometrical observations, and also, to make experiments on the flow movements and oscillations of the magnetic needle. The citizens Costaz, Beauchamp, and Nouet, are to investigate this subject.

7°. Two committees, the one consisting of the citizens Desgenettes, Dolomieu, and Say; the other, of the citizens Descotils, Malus, and Savigny, are appointed to superintend the digging of wells, in various parts of the neighbouring desert,

desert, and also to examine the nature of the water, and all the subordinate circumstances.

8°. In the neighbourhood of the aqueduct there is a considerable number of columns, which seem to have been formerly destined to decorate some public edifice : the citizens Denon, Norry, and Rigel, are to examine these columns in concert, and make a report on this subject.

On the 26th, citizen Norry delivered in a report in the name of the committee, charged to examine whether it were possible to derive any advantage from the ruins heaped up in a confused manner, around the city. He proposed to remove and employ a part in the public works : the summits of these piles will thus be flattened, and less difficulty will be experienced in respect to cultivation. It is likely that wells may be dug, the waters of which can be elevated to the necessary height, by means of machines of a simple construction : this species of hills will then enjoy the very rare advantage, in a country like this, resulting from the varieties of exposition.

Citizen Dolomieu observed on this subject, that the number of these heaps augments in a considerable degree, daily, and he remarked that it would be desirable that the committee should point out the means of preventing such an accumulation,

mulation. These observations were referred to several members, who are invited to make a new report on this subject.

A committee having been selected to examine the indigo presented to the Institute by citizen Porte, citizen Descotils read a report on the subject. He described the process employed at St. Domingo for the manufacture of this valuable commodity, and compared it with that at present in use throughout Egypt. In both methods they agitate the liquor which contains the blue colouring matter with paddles: this substance, combining with oxygen, becomes insoluble, and the indigo precipitates. But the principal difference consists in this, that here they bruise the plant after having macerated it for an hour in water, at the temperature of about seventy degrees, while in St. Domingo, the process of fermentation is allowed to commence. It results from the first mode that the soft parts of the plant mingle with the indigo, in consequence of which the colour is altered; and it appears on the other hand, that the fermentation destroys the extract of the plant, which remaining in combination with the colouring matter, opposes the complete oxygenation.

The committee was convinced that the Egyptian

tian process, which no traveller hath hitherto described, is capable of producing an indigo far superior to that at present manufactured, although of an inferior quality to what has been obtained by citizen Porte. The latter appears to unite all the properties of the fine indigos employed in the commerce of Europe; and the manufactures in which this method may be adopted, will be entitled to the support of government. These conclusions were adopted by the Institute.

Citizen Nouet gave an account of the examination made by a committee of which he is a member, relative to the different situations pointed out for an observatory. This committee is of opinion, that an insulated building should be erected, destined entirely for astronomical and meteorological purposes.

A committee having been appointed to examine several columns deposited near the first reservoir of water, belonging to the grand aqueduct, citizen Denon made a report on this subject.

Citizen Nouet delivered a report, in which he enumerated the various meteorological observations now practised; he at the same time described the instruments generally employed for this

this purpose, and pointed out the necessary precautions for regulating their use.

Citizen Dolomieu read a memoir on the causes which have produced the destruction of the monuments of the ancient Alexandria ; and he particularly remarked the effects in the building called the *mosque of the thous and pillars*. Within the walls of this place, where, according to some, the celebrated Greek translation of the bible was completed : a multitude of columns of Grecian architecture, of very unequal proportions, are now to be seen. The marble and granite have not been able to resist that continued impression which leads insensibly to decay. The scattered and deformed remnants of the fortifications of Alexandria bear testimony, in a still more convincing manner, of the ravages of time. These are modern, and scarcely reach beyond the expedition of Selim I. that is to say, the end of the fifteenth century.

After this exposition, citizen Dolomieu enquired into the nature of that cause to which these monuments are a prey ; which attacks the hardest stones in their natural beds ; penetrates into the interior of edifices ; and amidst encircling ruins permits nothing to subsist, but the broken

broken remnants of a few vases of baked earth. He considers the formation of the muriatic salts as a particular and accessory cause, which acts on calcareous masses alone; for the rubbish of decomposed granite is not impregnated with any salt. He imagines that all the facts detailed by him, as well as the circumstances which accompany them, may be explained in a natural manner, by the frequent variations of the hydrometrical state of the atmosphere. This alternation of dryness, and humidity, which is daily repeated, removes the *moleculæ* by little and little, and at length, separates them entirely. The humidity of the nights, being perpetuated by the great abundance of dews, is most sensible in the inferior region of the atmosphere; it is entirely dissipated by a nearly instantaneous evaporation, and the desiccation is still more rapid, wherever there is an eastern or southern exposition. It is accordingly towards the south-east, and in those parts of buildings that are nearest to the ground, where the principal waste is remarked, which does not extend above fifteen feet in height. Stones bedded in water, or such as are covered with a layer of earth; those also, which serve to shut up any enclosure where the air does not circulate freely, do not experience at all, or at most, but in a very

very small degree, the daily succession just alluded to, and thus escape as it were, from this cause of destruction which annihilates the precious remains of ancient monuments, and the barbarous traces of the middle ages. During the session of the 6th, Brumaire, (October 27th) citizen Geoffroy read a critical dissertation on that species of monkey called *cynocephalus* by the ancients, which is the same as that now carried about the streets of Cairo.

Buffon imagined he had discovered this species in the magot; and it has since been confounded with the papion or simia-sphynx. As the only persons among the moderns, who observed the true *cynocephalus*, have not left a written description, but only an imperfect print, it became difficult to distinguish between two species which resemble one another in so many points: there exists, however, a remarkable difference in many particulars, which citizen Geoffroy has pointed out. He took occasion to animadvert on the superstition of which this animal was the object, in ancient Egypt, the worship rendered to it, and the use that appears to have been made of its person in the hieroglyphics, on purpose to indicate the phases of the moon, and the division of time.

Citizen

Citizen Le Pere delivered a report on the 11th Brumaire, in the name of the committee, commissioned to propose a geographical scale proper to be adopted for the plans of cities and provinces. This report was adopted.

The examination of the scheme of a windmill, presented by citizen Cecile, was referred to a committee composed of citizens Monge, Le Pere, and Malus.

Citizen Geoffroy read a report in the name of a committee concerning the functions of the librarian. The different articles were adopted. The Institute then proceeded, by way of scrutiny, to the nomination of one, when the suffrages were in favour of citizen Ripault.

Citizen Geoffroy presented a memoir, in which he examined the nature of the horn of the stag, as well as the causes of the periodical fall, and reproduction of that organ.

On the 16th, citizen Geoffroy presented a collection of memoirs on natural history to the Institute ; this was deposited in the library. He also in the name of a committee, proposed a series of articles concerning the election to vacant places in the Institute : these were adopted.

During the session of the 21st Brumaire, citizen Le Pere delivered a report, in the name of the

the committee that had been appointed on the 10th, to examine the plan for a windmill by citizen Cecile. This committee, to which the citizens Fourier and Cortay had been added, was invited to present a new report, in which the project of citizen Cecile is to be compared with that confided to the direction of citizen Conte.

A committee having been appointed to enquire if the ruins heaped up about the city could be converted to any useful public purpose, the citizen Le Pere treated this subject in a report under a variety of different points of view. It was then requested that the committee should point out such machines as they might deem proper for conducting water to these eminences, with a view of fertilizing and rendering them valuable; it is also to estimate, with as much precision as possible, their presumed produce, the expences requisite for the execution, and particularly the extent of ground which may be refreshed by one of these machines.

Citizen Bonaparte proposed to nominate a committee to examine the process followed by the inhabitants of the country in the cultivation of corn, and to compare it with that customary in Europe: this proposition was adopted, and

and the citizens Dolomieu, Gloutier, and De-lille were appointed for this purpose.

Several members having had repeated opportunities of observing the address and confidence with which certain inhabitants of this country handle, play with, and even seem to attract serpents towards them, a committee, composed of the citizens Desgenettes, Geoffroy, and Denon, was appointed to examine into the facts, and deliver a report thereon, adding at the same time such remarks as their observations may have given rise to.

On the 26th citizen Fourier presented a report on the aqueduct that conducts the waters of the Nile to the castle of Cairo; he assigned the epoch of its construction, and gave a description not only of itself, but also of the machines employed there: he at the same time submitted to discussion a sketch of the *programma*, to be published by the Institute on this subject.

The Institute resolved, that after its secretary should have consulted the commander in chief relative to some of the details, a definitive project should be presented.

Citizen Le Pere delivered a report relative to the plan of a wind mill, now constructing under

the direction of citizen Conte. During a visit on the part of the committee, it had ascertained that his scheme united all the advantages which circumstances would allow of; this visit also afforded it an opportunity of doing justice to the order and precision which reigned throughout his yards and work-shops.

Citizen Larry, surgeon in chief to the army, once more submitted his memoir on the ophthalmic: this work was referred to a committee, composed of citizens Berthollet, Desgenettes, and Geoffroy, which was at the same time charged to make a speedy report.

Citizen Andreoffy read a paper containing the multifarious observations collected by him in the eastern and northern parts of the ancient Delta, while employed in obtaining information relative to the lake Menzaléh. He described the present state of that lake, the isles inhabited of old, the town of Menzaléh, the country adjacent to the lake, the mode of cultivation at present followed; in fine, he gave an account of the ruins of Tennys, of Torinah, of San, and of Peluse. He had recognized the Phatnitical, Mendesian, and Tanitical branches, and he now discussed the causes to which the original formation of

of lake Menzaléh ought to be attributed, as well as the operations proper for draining it.

The citizens Berthollet and Descotils presented observations on the properties of *Hhenné*, considered as a dye. This shrub, known to the ancients by the name of the cypris, is cultivated both in India and Egypt. Its leaf, when dried rapidly in an oven, and afterwards bruised, abounds with a colouring matter. By employing it alone with wool, a durable reddish colour is obtained : it also gives, through the agency of alum water, and sulphat of iron, a variety of different shades of brown, which promise great advantages, both on account of the durability of the tints and the easy rate at which they may be obtained.

The session of the first Frimaire (November 21st.) was opened by a mathematical memoir, addressed to the Institute by citizen Corancez. The author examined the means of remedying the alteration produced in the movement of watches, by the change of temperature : he proposed to compose the balance wheel of different metals, and endeavoured to obtain by calculation the proper shape of the several parts, that so the *vis inertiae* may remain the same, while the oscillating mass is either dilated or condensed. The examination of this subject was referred to a com-

mittee, composed of the citizens Costaz and Fourier.

Citizen Savigny read a dissertation on the natural history of the country: he enumerated the various species of animals hitherto observed by him in the Lower Egypt, more particularly the different kinds of insects. He at the same time pointed out some of the causes which may have contributed to reduce the variety of the species in this country.

Citizen Norry, in a letter transmitted from Alexandria, stated the motives which, by preventing him from making a longer stay in Egypt, thus deprived him of the satisfaction of participating in the labours of the Institute. In consequence of the observations of a member, it was resolved, that the section of the Fine Arts should prepare a list of candidates by the 11th Frimaire, for the purpose of supplying his place.

Citizen Sucy read some remarks on the causes of the regular increase of the Nile, and insisted on the utility of consulting such of the inhabitants of the neighbouring countries as were then in Cairo, relative to the source of that river. He also moved that the committee appointed to take this subject into its consideration might at the same time collect every possible

sible article of information relative to the upper waters of the Nile, and the history, both natural and civil, of Abyssinia and Nubia. This proposition was adopted, and the citizens Beauchamp, Costaz, Dolomieu, Geoffroy, and Sucy, were selected to compose the committee.

EXTRACT OF A REPORT

Delivered to the Institute, relative to the Manufacture of the Saltpetre and Gunpowder of the Country.

By Citizen ANDREOSSY.

At Cairo, the 11th Fructidor, 6th
Year of the French Republic.

SULPHUR, charcoal and saltpetre, are, as every body knows, the materials made use of for the composition of gunpowder. Egypt does not produce any sulphur; it is usually carried hither from Venice and Trieste; it might be brought directly from Sicily, in which case it would be cheaper.

The production of which they make charcoal is self-sown in the country; this is the lupin, a plant that bears a small bitter fruit, which might be employed in the manufacture of beer. The stalk of the lupin is converted into a very soft charcoal, which leaves a distinct mark when applied to paper. This charcoal is burnt in trenches, and the space of three hours is sufficient for that purpose. After pounding it, it is passed six or seven times through a sieve, on purpose to obtain

obtain the finer particles alone. This combustible may be employed in large quantities, without augmenting the consumption of wood proper for fuel.

Saltpetre appears to be an indigenous production of Egypt; the infrequency of rain, a continual heat, the moist air of the night, a soft and light soil; all these concur in its formation. It is said that the earth containing saltpetre is found in veins, which are worked in some places in the neighbourhood of Cairo; these veins are very productive during three or four months, and at the end of that period, they are abandoned for an equal space of time, during which the ground being exposed to the influence of the climate, becomes once more prolific.

The process employed here in the manufacture of saltpetre, is exactly the same with that practised in Europe. One circumstance, however, renders this mode not only very simple but also unexpensive. The saltpetre is found in this country already formed in the earth, while in France they are usually obliged to obtain nitre with an earthy basis by means of a ley, which is afterwards converted into saltpetre by the admixture of potash, an expensive and foreign production.

Saltpetre is manufactured on the road from New to Old Cairo, behind those little eminences of rubbish, produced by the avarice and carelessness of the Mamelukes: this establishment does not present any thing remarkable. Boxes made of boards serve as vats, and they are placed in the open air.

A trench formed on the surface of the earth, conducts the water impregnated with saltpetre into a reservoir under a hut, while a large copper caldron with a furnace beneath, is fixed by its side.

The combustibles employed on this occasion are the stalks of Indian corn, as well as a plant that appears to be a species of grafts, which grows in arid lands; this plant does not produce so much heat as the stalks of Indian corn.

The saltpetre obtained by the first boiling, is pretty good. It is purified by a second and third operation, during which a mucilage of whites of eggs is employed.

The gunpowder is fabricated by means of manual labour; it is composed of eight parts of saltpetre, two of sulphur and two of charcoal. These three materials are thrown into mortars cut in stone, and rounded at the bottom; the diameter at top is one foot, and the depth is also

also one foot. In a parallel direction, and at a little distance from these, is a stone bench, on which the workmen sit. They are naked from head to foot, except a few rags, which are twisted round the middle. Every mortar contains fifteen pound of composition: this is pounded for seven hours, by means of a pestle formed of an extremely hard wood that is brought from Syria. The workmen accompany the descent of the pestles with a strong aspiration, which enables them to act in concert, and serves to produce uniformity in the operation. They labour with these pestles, which weigh 9,294 grammes, during four hours, they then rest for two, resume their work for three more, and gain by this employment about from twenty to twenty-five *parah* a day.

A very small quantity of water is thrown into the mortars, to render the composition humid, and facilitate the mixture and compression of the materials. When taken out of these, it is passed through hair sieves, like those employed for corn, the interstices of which have more or less width, in proportion to the finer or coarser powder that may be wanted. The commodity is then grained, by pressing it against a grating with

with the hand, taking care to communicate a circular motion to it at the same time.

The gunpowder manufactured at Cairo appears to be good; the materials of which it is composed are excellent in point of quality; and according to recent enquiries, it appears that seven hours is a longer portion of time than is required for grinding it; by regulating it according to the standard of France, which is acknowledged to be the best, the strength may be augmented, and the consumption of sulphur, the sole material that is imported, greatly diminished. Gunpowder is not so dear at present in Cairo as it was in France, anterior to the revolution.

Egypt exports yearly to Leghorn, and Marseilles, fifteen hundred *qanthars* * of saltpetre, of the third boiling, which is sold at Cairo, at from nine to nine dollars and a half each. About two thousand *qanthar* of gunpowder, are manufactured every year at Cairo; from fifty to sixty *qanthar* were formerly consumed in escorting the caravans; the remainder was either exported to Syria, and Cyprus, or sold to the Arabs.

* The *qanhar*—(*gonthar*, or *ganhar*) is the quintal of the country; it weighs about 91 pounds avoirdupois, and is divided into a hundred *rothl*. The *rothl* amounts to 14 ounces, 4 qr. 27 grains. (J. J. M.)

The Mamelukes do not possess any large magazines. Each Bey collects in his dwelling some qanthars of gunpowder, two or three pieces of canon, and a few chests of arms, in proportion as he possesses Mamelukes, and horses proper for mounting them: the union of all these constitutes the whole military force of Egypt. Mourad-Bey was the only one who was accustomed to keep any quantity of gunpowder. After the death of Ismail-Bey, he found about a thousand *qanthal* of ammunition among the spoils, and within the space of the last seven years, he has purchased from five to six hundred more.

The fabrication of gunpowder was confided to the industry of a few foreigners, who had settled in Egypt. It has already been seen, that the consumption of the government, added to the exportation, amounted to a mere trifle; thus the product was of course inconsiderable; nothing is more easy however than to encrease it. Egypt possesses two essential materials, the charcoal and the saltpetre, the latter of which is in some measure already prepared; sulphur can be brought at proper opportunities from Sicily by the way of Malta; the establishment may thus be easily augmented, and the workmanship simplified. Egypt can furnish gunpowder to our

French

French islands in the Mediterranean, to the arsenals of our Italian and Spanish armies, and might even export to Marseilles, and the ports of Languedoc, and Roussillon, a large quantity of saltpetre, which would circulate throughout the southern departments of France, and also in the interior.

Higher Egypt possesses some manufactories of saltpetre and gunpowder, the particulars of which, we have not as yet been able to learn.

N. B. We have entered into a few of the details relative to the fabrication of gunpowder, the object of which was entirely foreign to the *programma*, merely for the purpose of painting the barbarous physiognomy of the arts, among a people who have attained the last stage of degeneracy.

DESCRIPTION OF THE ROUTE FROM CAIRO TO SSALEHHYEH.

Cairo, 16th Fructidor, 6th year.

Egypt has always fixed the attention of the literary world, more than any other portion of Africa. A multitude of travellers have accordingly repaired thither to seek for the vestiges of its ancient splendor, but a wretched, and barbarous people, have constantly opposed their researches. It was impossible

possible for the antiquary to rummage the bosom of the earth; the naturalists were afraid to wander along the fields; the geographer did not dare to make use of his instruments: thus the prying eye of the European could merely skim along the banks of the Nile, and beyond its shores we knew little or nothing.

But the conquest of Egypt presents a new field for letters. All our notions relative to that interesting country will be successively aggrandized; that spirit of investigation with which we are at present electrified will be satisfied, and we shall be at length able to point out the road that leads to the perfection of divers branches of the sciences. But that which will be first enriched by our labours is geography. To conquer, is in other words, to march over, and become acquainted with a country. The French had scarcely carried the terror of their arms into new climates, when they hastened to render even the preparations for victory useful, that they might thus do homage to the arts. The rapid sketch of the various positions of a country, and their connexion with military movements, will henceforth serve to direct the progress of the merchant, and, perhaps, to extend the industry of the farmer.

They

The route followed by the three divisions of the army in pursuit of Ibrahim-Bey, was unknown until our time. Since the period of the croisades, no European had traversed those provinces. Neither Pococke in his numerous journeys ; nor Niebuhr, who displayed so much constancy in his researches ; nor Norden, who described Egypt with uncommon minuteness, dared to penetrate them. The description of this extent of territory, being then absolutely new, it has of course some pretensions to the curiosity of the public.

One leaves Cairo by the gate of Nassr (*Bab-en-nassr**, the gate of victory). The desert is the

first

* The gate d'En-nassr (or of victory) is one of the entrances of Cairo, and looks towards the east. " It was originally situated at some distance from the place where it now stands, according to the Maqryzy ; but when the Emir El-Djyouch Bedred-dyn El-Djemaly quitted the city of Acre, to become vizir of Egypt, under the Khalyfat of Al-Mostansser Billah, in the year 465 of the hegira (1072 of the vulgar æra), he built the walls of Cairo, and changed the spot which the general Djaucher had assigned to this gate, in order to transfer it to its present position, and it is now nearer to the *Mosslay El-Fyd*. He added to it a kind of covered way, (*Bachourah*) part of which still remained when the sister of El-Dtaher Barqouq caused a cistern to

first object which attracts the eye ; its parched limits encircle the walls of the city, after having invaded part of the suburbs. Groupes of deserted houses are to be seen in the midst of this whitened plain. The most considerable of these places is called *Qoubbeh*, (*El-Qoubbet El-a-adelyeh*, the dome or cupola of justice *), It is a mosque surrounded by regular edifices, built with stone, and having galleries before them. At a league from *Qoubbeh* you fall in with the vil-

lage

be dug there, which is at present destroyed, and a road substituted in its place."

Above the gate of *En-nafr* is to be seen the following inscription in koufic characters: *La illah illah allah, oue Mohammed recou ulah, A'ly ouely ulah, f selouat ulah a'lay houma* (there is no god but God; Mohammed is the apostle of God, and A'ly the friend of God; may the divine grace protect them !) See La Description Geog. Polit. &c. de l'Egypte, par le Maqryzy, article des portes du Caire, pages 212 et 213 du numero 682. M.S. Arab. de la Bibl. Nat. (L—s.)

* *El Qoubbet Ela'-a-adelyeh*, does not signify the *dome* or *cupola of justice*, but merely the cupola (the mosque) A'delyenne, that is to say, founded by El-melek El-a'adel Aboubekr Ebn Eyoub, brother of the famous Saladin (Sfalahhed dyn), and known in the history of the Croisades by the name of Saphadin. This prince, who was at first

sultan

lage of *El-Matharyeh**. The obelisk perceived there, points out the ruins of the ancient *Helio-polis*. A search has just been commenced, which may lead to the discovery of more interesting objects. The village of *El-Mardje*, which lies at the back of this, is perceived at a great distance on account of the grove by which it is surrounded. Several thousand palm trees, planted in the manner of a quincunx, shade the ruined huts.

This route, which is that followed by the caravans, in their journey to Syria, astonishes the European on account of the fantastical appearances it exhibits: it seems to form the boundary between Egypt and the desert. The sands are always on your right, the cultivated lands constantly on your left; the human eye

sultan of Krak, and Damascus, ascended the throne of Egypt, after having displaced Mansour, his grand nephew. He died August 1, 1218 of the vulgar æra, at the age of feventy-three years; he had reigned eighteen. See the Universal History of Gregory Aboulfaradje, in Arabic and Syriac. (L—s.)

* *El-Matharyeh* signifies rain, or fresh water. This place is in fact the only one, within a considerable distance, where a spring is to be found. It was formerly famous on account of the balm produced there; it is the *a'inchemis*, or fountain of the sun of the aicients. The French commonly write it *la Mutharree*. (L—s.)

is

is bewildered in the extent of the first; it gladly reposes on the other. The more you advance, the more Egypt is covered with woods: the villages are scarcely distinguishable amidst the enormous masses of date trees. Large sycamores are not uncommon, and almost every where we meet with vast inclosures of acacia and citron trees. But it is necessary to prevent all illusion while depicting these groves; neither verdure, nor flowers, nor rivulets embellish their neighbourhood. Trees, which are accompanied by so many charms in Europe, here insert their roots in an argilaceous soil, yawning with fissures, and every where evincing the aspect of the most hideous poverty.

If the eye should wish to fix itself on one side, on a more active vegetation, a little reflection destroys the momentary impression, for the outline of the desert is at the same time beheld making an incursion on the cultivated land. The hillocks destitute of cupolas exhibit only abandoned habitations, and at every step we meet with the traces of agriculture, nearly effaced by the sand, while we search in vain for a small portion of the arid border that has been restored to husbandry.

From the village of El-mardje may be distinguished

guished the spot called *El-khanqah*, which is considered as one of the most important places in the country. Between these two villages is a tufted grove; it occupies the summit of an ascent, that inclines gently towards the desert, and terminates at the famous lake *Berket-el-hhadje* (the lake of pilgrims). At present it is nothing more than a parched mass, surrounded by several rows of trees.

The hamlet which I have just described, appears to correspond with that which formerly contained the Pelusiac branch; this was the most easterly channel of the Nile; it advanced towards the desert, and has probably disappeared in consequence of the overwhelming whirlwinds. The water formerly conveyed by it is no longer visible, while at a short distance in its rear, canals still exist in the place of those which flowed towards the mouth of the Mendezian channel.

The frequent passage of caravans was assuredly the cause of the increase of *El-Khanqah*. What still exists of this village, three parts of which are converted into ruins, indicates a remnant of its former opulence, and also of the care with which it had been constructed: it is the first place in Egypt where I have seen a street laid out in a straight line.

After

After passing El-Khanqah we meet with a succession of villages, which present nothing remarkable; and at the end of seven hours arrive at *Belbeys*, the only town to be met with in this route. *Belbeys*, which is believed to be the ancient Bubaustum, only contains ruined houses, and miserable inhabitants; it scarcely occupies one third of its former dimensions, as may be easily perceived from the traces of the ramparts, which yet exist. Six centuries since, this place was the only bulwark of Egypt against Syria. In 1164 it opposed a vigorous resistance to the attacks of Amurath, king of Jerusalem, and contained wealth sufficient to occupy his army during three whole days with its pillage.

This event, which appears to have been common enough, was perhaps the principal cause of the ruin of the Latins in Palestine. Until then, the valour of our knights was supported by the austerity of their manners, and a spotless probity: they were respected by their numerous enemies, who even appeared jealous to imitate them. But Amurath, by invading Egypt in opposition to the faith of treaties (in 1168), and withdrawing in consequence of the receipt of certain sums of money, destroyed the illusion produced by the valour of the Franks. The Turks were not

ashamed to add perfidy to the immense superiority of their forces; and the feebleness of the Christian adventurers increasing by corruption, rendered them unable to retard their fall.

On leaving Belbeys the country appears more fertile than ordinary; the villages succeed without interruption, and connect themselves together by means of orchards. The fountains and insulated cupolas also become more frequent. But these scenes are dispelled the moment we pass *Sforiah*: all the cultivated lands disappear towards the left side; and it is necessary to traverse three leagues of desert, as far as *Qorayn*, unless a considerable circuit be preferred.

The place called *Qorayn* (*Qorain*) is a pretty large wood, which contains from eight to ten houses, with their gardens. It enjoys considerable reputation in this country, on account of its castle; but certainly no European will be willing to attach the idea of a strong hold, to a collection of houses surrounded by an earthen wall, through which he enters by a gate, destitute even of fastenings; but in this country, defences like these are sufficient to convert any enclosure into an inexpugnable asylum, the violation of which will never be attempted by men on horseback, armed with nothing better than lances.

From

From Qorayn, six leagues still remain before you arrive at *Sfalehhyeh*. During one half of the journey the road leads along the side of some villages, but they are soon left at a distance, as it is necessary to pass through an uncultivated waste, that continues until you arrive at the place of your destination.

Sfalehhyeh, although it does not possess that pleasing appearance which the tufted gardens of Qorayn produce, is however far more extensive: a wood, above two leagues in length, encloses about ten villages, as well as a fine mosque built entirely of stone. The Arabs call all these insulated woods, isles, (*djezyret*), an expression that conveys an allusion to the uncultivated lands that surround them, and which prevent as few resources as the waters which encircle an inhabited land.

The name *Sfalehhyeh* is derived from that of *Melek-Sfalehh**, the famous sultan whom our

* It is necessary to write and pronounce it *Sselahh*, and not *Sfalehh*. The whole of the name is *Sselahh ed-dynyou-consebn eyoub ebn chady*. The word *el-melek* is a title that signifies king. I think it proper to remark here, that the *alif* does not appear to me to be necessary in the word *Sfalehhyeh*, which ought to be written *Sfalehhyeh*, without the *alif*. (L-s.)

authors term Saladin ; it was he who first fixed the attention of Egypt on those distant villages.

Experience had convinced this warlike prince of the insufficiency of the ramparts of Belbeys ; he also perceived the danger that menaced Damietta (*Damyath*), if the Christians happened to attack it, and he did not wish that the existence of his empire should be shaken by a single siege. To possess a strong place on the enemy's flank while ascending the branch of Damascus, and to stop the progress of an army coming from Syria, was the object proposed by Saladin, in constructing a fortress at Sfalehhyeh, which is absolutely the last boundary of the cultivated lands of Egypt. At the end of these woods commences the isthmus of Soues (*Souys*), and it is then necessary to traverse fifty leagues before any inhabited spot is to be met with. During the whole of this space the traveller meets with nothing but a barren soil, and falls in with only seven wells, which afford but a scanty supply of brackish water.

It was in vain we endeavoured to discover the vestiges of the fortress of *Melek-Sfaleh* : even the tradition of its site has been forgotten.

After having thus presented a general idea of the places which it is necessary to traverse during

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the space of twenty-five leagues, it may be proper to take a rapid survey of the soil and the inhabitants.

The preponderant *cast* in these countries, without being the most numerous, is that of the Bedouyns. Their camps are stretched at some distance from the villages of Egypt, for they always give a preference to the soil where they reign—the sands of the desert. These Arabs appear to me to be more opulent than those which I have formerly seen along the banks of the Nile. It is true indeed, that a thousand resources are here presented to their industry: sometimes they traffic with the produce of their herds, at others, they either extort a ransom from, or escort the caravans. Many of them cultivate the earth, and all of them possess a peculiar taste for the branch which is the most lucrative of all their revenues: that of pillaging every thing without the pale of their tribe. Their cabins appear to be different from those low tents, where the Arabs of Dammanhour squat themselves down; the walls of their habitations consist of matts composed of rushes; and the tent, which is always spacious, only covers the middle of it.

Within prevails a kind of abundance, which is always however relative: milk, rice, barley,

are not uncommon ; the utensils are numerous, and not unfrequently bales of valuable goods taken from travellers are buried beneath.

This degree of plenty has an influence on their manners. Although well provided with every thing except fire-arms, which are difficult to be procured, yet they but seldom engage with their enemies. They treat with the Mamelukes, and spare the inhabitants, never recurring to violence, unless perfidy should prove unsuccessful, and attaching no shame to a precipitate flight from danger. Accordingly, on our arrival, one of our horsemen drove several of them before him—this cowardice surprised us greatly, as it formed an exact contrast with the courage of the Bedouyns in the neighbourhood of the branch of Rosetta (Rachyd), whom we had seen approach under the very muzzles of our muskets, in search of an uncertain booty.

The Fellah inhabiting the Charqueh, appears to me to be less wretched than him who lives on the borders of the Nile: there are shades even in misery. The culture of the soil of itself demonstrates, that all the produce is not wholly absorbed by the proprietor who resides at Cairo. Until then, during the course of our journey, we had seen nothing but immense fields, full of large crevices,

crevices, which being equally destitute of furrows and enclosures, appear to have been tilled by an uninterested hand, and to be watered once a year by the encrease of the Nile alone. Here it is otherwise; every foot of earth exhibits the toil of the peasant; the wells are kept in order; trenches prepared with great exactness, conduct the canal along the fields, while an immense number of beds, surrounded by a ledge, preserve the moisture on the fields that have been already watered.

Other observations may be added to these respecting the cultivation of the lands, and I might quote the immense quantity of date trees, each of which has its net, those spacious orchards, those villages surrounded by a square wall, if they be near the desert; in fine, that lively solicitude painted on the countenances of the inhabitants at our approach, far different from the apathy which ever accompanies extreme indigence, and which we had remarked in other places, during the course of our journey.

But to what are we to attribute this melioration in the lot of the peasant? Is it the consumption occasioned by the caravans? And is this the only commerce? I do not presume that to be the case, and I am rather inclined to ascribe the

the cause to the distance of their oppressors. The Mamelukes levy their exactions with security in such places as are situated on the borders of navigable canals; for their waters bearing away with rapidity the fruits of their spoliations, all fatigue on the part of the emissaries of the government is thus spared. But here, in order to traverse twenty leagues of ground, more expensive preparations must be recurred to, and a larger body of satellites employed: a few men are not sufficient to domineer over a crowd of villages, situated in a narrow space, and those Arabian camps replete with combatants. To form an establishment with a numerous retinue, it would be necessary to leave Cairo; and to multiply the number of their forces, by means of constant activity, would not comport with the indolence of the Mamelukes. The Beys, who are proprietors of the Charqyeh, being forced to choose between a less abundant, but certain revenue, and the hope of a larger one, accompanied by danger and fatigue, prefer repose. Their principal wants originate in luxury and enjoyment; and thus the inhabitants of the borders of this desert find a refuge against tyranny in the vices of their masters.

P. S. I shall

P. S. I shall affix to the bottom of this description an approximation of the respective distances, and also of the population of the places already mentioned ; this will serve to fix the ideas which may be formed relative to these countries, until more exact observations shall have rectified mine.

El-Qoubbeh, a deserted village, at half a league from Cairo.

El-Matharyeh, five hundred inhabitants ; situated one league from El-Qoubbeh.

El-Mardje, eight hundred inhabitants ; it is a league and a half from El-Matharyeh.

El-Khanqah, one thousand inhabitants ; it is a league and a half from El-Mardje.

El-Menyeh, two hamlets, at two leagues and a half from El-Khanqah, with about one thousand inhabitants.

Belbeys, eight hundred heads of families.

This in the East, on account of the number of women, may be estimated at six persons to each family ; thus amounting to nearly five thousand inhabitants. This town is five leagues from El-Menyeh.

Sfouat, eight hundred inhabitants ; four miles from Belbeys.

Qomayn,

Qorayn, three leagues from Sfouat ; consisting of from eight to ten hamlets, which contain about four thousand inhabitants.

Sfalehhyeh, six leagues from Qorayn ; fifteen hamlets, and about six thousand inhabitants.

There are several other intermediate places, but we traversed them with such rapidity, that it was impossible to make any remarks.

CIRCULAR LETTER,

From Citizen DESGENETTES,

To the medical Men of the Army of the East, relative to a Plan for drawing up a Physico-Medical Topography of Egypt.

Head Quarters at Cairo, 25th Thermidor,
6th Year of the French Republic.

THE army, citizens-colleagues, after a siege, several battles, many skirmishes, and the most distressing marches across the deserts, begins, for the first time, to enjoy some moments of repose, since its arrival in Egypt. Its prodigious activity hath hitherto stifled the germ of those diseases, which are now likely to make their appearance, and concerning the treatment of which, it is proper for us to make the necessary provision.

The present season, like all others, hath maladies peculiar to itself: diarrhoeas and the dysentery are those we have most to dread; and the ophthalmmy, which is endemic in Egypt, begins to associate itself with these, in an alarming manner.

ner. This last disease is sometimes simple, and idiopathic ; it is then to be considered as appertaining to the class of ordinary and local inflammations, and is to be treated in the same manner. At other times it is concomitant with, or symptomatic of diarrhœas, and dysenteries, and it is most likely to follow the suppression of those evacuations, which it becomes necessary to recall by minoratives.

Perhaps, also, in some circumstances, the ophthalmia is to be viewed as a crisis of diarrhœa and dysentery. In other respects, the *œtiology* of the several kinds of ophthalmies is simple, and may be explained by this axiom, in the theory of fluxes : wherever a point of irritation exists, there the humours constantly flow.

In addressing myself to you, citizens-colleagues, relative to our common duties, and the means of rendering ourselves as useful as possible to the army, I cannot be too earnest in recommending the perusal of Proser Alpinus (*de medicina Ägyptiorum*). That estimable work points out to each of us the propriety of undertaking a very commendable task ; this consists in making extracts, in the course of which, setting aside a verbose diction, and exploded theories, that portion only should be preserved, which appertains to actual

actual observation, and the grand practical deductions to be drawn from it. Those extracts might become, as it were, the text of a commentary, in which we could insert such interesting facts as might happen to occur in the course of our daily practice.

The same author hath written another excellent work (*Rerum Ægyptiarum, Libri IV.*), which contains a variety of interesting details relative to the natural and civil history of Egypt, as well as the manners, arts, and whatever else is likely to become the object of the useful labours, I have already advised you to undertake relative to medicine.

Our functions with the armies are not confined to the treatment of maladies; we ought constantly to attend to whatever can ensure the health of military men, and our duties on this subject are sufficiently detailed in the laws and regulations explanatory of them.

But for the proper application of the principles of the healing art, and, in order to discover such medicaments as are efficacious in a country new to us, it is indispensable to draw up a proper description of its topography. This consideration now induces me to present you with an uniform plan, which will be useful to you in the classification

classification of your observations ; you will easily recognize, that with an exception to the local positions, this is borrowed from the sketch which more able hands have drawn up, for the physico-medical study of France.

1°. To examine the nature of the soil of the country, of which you wish to obtain a knowledge.

2°. To obtain a knowledge of the longitude and the latitude, as also of the general exposure.

3°. What are the prevailing winds.

4°. What are the principal physical qualities of the waters of the Nile, of wells, and cisterns ; as also their influence on vegetation, and on the health of men and animals.

5°. Of what species are the trees, the shrubs, and the other plants ; more especially those employed in either cookery or medicine, that grow in the places here described.

6°. What are the different kinds of grain cultivated ; in what manner are they cultivated ; what diseases are they subject to.

7°. To examine carefully, and point out the numerous medical substances that are brought in the course of commerce, from Asia to Africa, and particularly to Egypt.

8°. What are the animals belonging to each class,

class, that are indigenous in Egypt, and foreign in Europe: you are also to collect all possible information relative to the maladies of such domestic animals as alleviate and participate in the labours of man. And

9°. You are to obtain a knowledge of the general disposition of the inhabitants, their food, drink, clothing, the manner in which their houses are constructed, their occupations, and customs; the most common diseases to which boys, men, girls, and women are subject; the usual method of treating them; at what epoch does menstruation begin and end; is the fecundity of the females remarkable; what is the usual extent of life?

Egypt is supposed to have been the cradle of medicine, as well as of the other objects of human knowledge; but it must be allowed that the history of our art is very uncertain and obscure. Among the Egyptians it is accompanied with a variety of ridiculous superstitions, and reason has nothing to rely on, except the establishment of corporations of physicians, whose rules being sufficiently known, presuppose a series of doctrines that must have been sanctioned by success. But the epoch, at which an extensive knowledge of medicine appears likely to

have prevailed, is that, when after the burning of the library of Alexandria, the caliphs relighted at Antioch, at Hharan, and at Bagdad, the torch of learning, by means of the signal protection they afforded it. It was then that Hhonain translated into Arabic, the Syriac recipes of the Greek physicians; and it was by following this example, that in a later time and different places, Rhazes (Al-Rhazy) Abou-l-Kasis (Khalafaboul qacem), Avicenna (Ibn-syna), A'ly-A'b-bas, Mefueh (Meoçouyeh), Aven-Zoar (Aven-Zouhar), and Averroes (Ebn-Rochd), all of them Arabian physicians, consecrated the same doctrine in the numerous writings still revered throughout the East. An intimate acquaintance with their models, added to the progress of knowledge, will not permit us to place these men among our legislators, but we are under great obligations to them for having preserved the medical system of the Greeks: and in this consists their real glory, although they may also boast of having perfected surgery, and in some respects created pharmacy, by the application of chemistry, which they cultivated with success. It will not however be considered as a merit at the end of the eighteenth century, to have introduced a number of medicaments the luxury of which is still more dangerous than ridiculous.

There must still exist, and I myself have discovered traces of this ancient science in Egypt. Study then with attention the practice of the country, however despicable the empiricism of it may appear to you at first sight: it will be necessary to become acquainted with, before we possess any right to condemn it. Be also assured, that in a new climate, and indeed every where, even those who possess but little learning, can teach us much useful knowledge.

Our profession, in addition to this, citizens-colleagues, will give you opportunities for observation, which do not present themselves to other men. The eastern nations, notwithstanding their prejudices, have always exhibited a great confidence in the physicians of Europe; it is this consideration that hath often induced travellers, who were strangers to our art, but whose minds were cultivated by the sciences, to recur to it, as a title to their esteem. The services rendered by you, will be far more striking, and you will assuredly procure all the information in exchange which you may be desirous to collect; it is necessary for the honour of the human heart to believe, that benefits sometimes excite gratitude.

The physician in chief to the army,
R. DESGENETTES.

REPORT,

Relative to Pompey's Column, read before the Institute, on the 6th Vendemaire, 7th Year,

By Citizen NORRY.

THE small number of admeasurments hitherto given of Pompey's Column, and these frequently stated in the most uncertain manner by the different authors who have mentioned them, determined the citizens Dutertre, Protin, Le Pere, and myself, to ascertain the various proportions before we left Alexandria. Citizen Dumanoir, the commandant of the port, whom we had requested to facilitate the operation, by preparing cordage, &c. on board his ship, was eager to second our intentions.

At five o'clock in the morning of the 14th Fructidor, we repaired to this monument accompanied by a guard. We began by letting fly a kite* of about four feet in heighth, to the string of which was fastened a cord of an indefinite

* The same mode was employed a few years before.

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length, that was feized by one of us when the kite had ascended above, and passed beyond the capital; so that by pulling the line it descended to the earth, and was instantly separated. We thus had a cord stretched across the capital of the column, in the same manner as if it had been placed around the circumference of a pully. When this first operation was completed, a second, of a larger size being tied to one of the extremities of the former, and substituted in its place, a third capable of supporting the weight of a man, was immediately attached. A sailor was then drawn up to the capital; and the first thing performed on his part, was to throw down an imitation of a stand of colours, formed out of hammered iron, which had been placed there in 1789, by Favel, a French artist; on this was marked the total height of the monument, estimated at 88 feet, 9 inches. After the sailor had tied the cordage firmly round the volutes of the angles, and made other necessary preparations, I placed myself on a seat suspended by a rope, and was immediately drawn up. Citizen Protin ascended soon after, and we measured the various parts of the capital together; while the citizens Le Pere and Dutertre took the dimensions of the base and pedestal. We then estimated the total height,

height, which was within 8 centimetres (three inches) of Favel's calculation: it amounted to 28 metres, 73 centimetres (88 feet 6 inches).

Nothing now remained, but to measure the diameter of the column, at different heights. To effect this, we had disposed a square, the sides of which were about five feet in length, with a moveable index, sliding in a groove, which divided the angle into two, being so disposed as to advance, or recede, in order to touch the circumference at each station, where the shaft of the pillar was embraced horizontally by the square. In consequence of this, and by considering the hypotenuse of each of the triangles that determine the different lengths of the index, as so many sides of an octagon, we were enabled to find the various circles inscribed by these octagons, and consequently their diameters. In order to perform the operation with precision, the person who made use of the square at the different stations on the shaft, applied the level, which assisted him in placing it horizontally, by lowering or raising above the column, the extremities of the two arms of the square, to which cords were appended. By means of this process, we completed the business with the greatest exactness. Several members of the Committee of Arts witnessed

nessed our proceedings, and the greater part of them afterwards ascended the enormous capital on which we stood to the number of six or seven.

It now only remains for me to add a few words relative to the disposition, the division, the principal dimensions, the nature of the materials, the age and the proportions of the monument.

It is situated on a gentle eminence, and placed on a base, which the barbarians have undermined ; a centre of *one metre and twenty-eight centimetres* (four feet six inches), in form of a square, serves as its sole support. This centre is formed of the fragment of an Egyptian monument, which appears to be of a silicious nature, and must have been brought to this place, as the hieroglyphic characters are reversed. On an attentive examination of the waste committed beneath the pedestal, it is perceived that the rubbish, being laid in heaps, has occasioned the column to lean *twenty-one centimetres* (eight inches) ; and it is undoubtedly to this cause that may be attributed a deep crevice of about *four metres eighty-seven centimetres* (fifteen feet) in length, at the lower part of the shaft.

This monument, which is of the Corinthian order, is divided into four parts, pedestal, base,

shaft, and capital; a circle of two *metres* two *centimetres* (six feet three inches) in diameter, and which has experienced a depression of six *centimetres* (two inches), gives reason to suppose that there has formerly been a projection on the top for supporting, perhaps, the figure of the hero to whom this column had been elevated; but this is merely conjectural.

The pedestal is three *metres* twenty-four *centimetres* (ten feet) in height; the base, one *metre* seventy-eight *centimetres* (five feet six inches three-tenths); the shaft, twenty *metres* forty-eight *centimetres* (sixty-three feet one inch three-tenths); the capital, three *metres* twenty-one *centimetres* (nine feet ten inches six-tenths); the diameter of the column is two *metres* seventy *centimetres* (eight feet four inches) in the lower part, and two *metres* forty-nine *centimetres* (seven feet two inches eight-tenths) near the astragal: the total height, as has already been observed, is twenty-eight *metres* seventy-three *centimetres* (eighty-eight feet six inches). The whole of the pillar is formed of Thebaic granite.

Although its order be in some measure considered as Corinthian, on account of its capital, it however does not exhibit the Grecian proportions; those of the shaft approach the Ionic. It

is evident, in other respects, that the different members of which it is constituted appertain to different ages. The shaft is of an admirable galba, and exhibits an excellent polish on every side, except that towards the desert, which has suffered from the sands; it appears to have been formed by the hands of the Greeks, perhaps under the Ptolomeys. As to the other parts, they are evidently inferior. The profiles have a near resemblance to those of the lower empire among the Romans; the capital is only remarkable for the coarse massiveness of its form; the pedestal is exceedingly low, and the colour of the granite employed there differs from that of the shaft.

It may fairly be conjectured, that this shaft which was evidently constructed before any of the rest, has been re-erected at some extraordinary epoch. It is greatly to be regretted, that an inscription formerly placed on one of the sides of the pedestal, should be no longer legible; were it not for this, we should be better informed relative to this monument, which some authors attribute to the memory of Pompey, and others to that of Septimus Severus.

A MEMOIR,

Relative to the Optical Phenomenon, known by the name of MIRAGE.

By Citizen GASPARD MONGE.

DURING the march of the French army through the desert, from Alexandria to Cairo, we had an opportunity of observing a phenomenon daily, that must be considered extraordinary by the greater part of the inhabitants of France. It is necessary for its production, that the spectator should be placed in an extensive plain, wholly, or at least nearly, level; that this plain should be prolonged to the limits of the horizon, and that the soil, by exposure to the sun, should have acquired a very high degree of temperature. It is supposable that these three circumstances may be united in the *flats* of Bourdeaux; for their level, like that of lower Egypt, is nearly horizontal; they are not terminated by any mountain, at least in the direction from east to west; and it is probable, that during our long summer days the arid soil of which they are formed

formed may acquire a sufficient temperature. It is therefore not wholly improbable, but that this phenomenon may be known to the inhabitants of that department; it is familiar to mariners who observe it frequently at sea, and have given it the name of *Mirage*.

In truth, the cause which occasions the *Mirage* in the ocean, may be very different from that which produces it at land; but the effect being the same in both cases, I have not deemed it proper to introduce a new word. I shall first describe the phenomenon, and afterwards endeavour to give an explanation of it.

The country of lower Egypt is nearly a level plain, which loses itself, like the sea, in the clouds at the extremity of the horizon: its uniformity is only interrupted by a few eminences, either natural or factitious, on which are situated the villages, thus kept out of the reach of the inundations of the Nile; and these eminences, less usual on the skirts of the desert, more frequently to be seen on the side of the Delta, and which appear like a dark line on a very transparent sky, are rendered still further visible by the date trees and sycamores, oftener to be met with in such situations than elsewhere.

Both morning and evening the aspect of the country

country is exactly as it ought to be ; and between you and the last villages which present themselves, you perceive nothing but land ; but when the surface of the earth is sufficiently heated by the rays of the sun, and indeed until it begins to get cold towards the evening, the land no longer seems to have the same extension, but to be terminated, to within the distance of about a league, by a general inundation.

The villages placed beyond that, appear like so many islands stationed in the midst of a great lake, from which the spectator is separated by an extent of land, more or less considerable, according to circumstances. You then behold the image of each of these villages reflected exactly as if it were exhibited on a clear surface of water, with only this difference, that as the representation is at a considerable distance, the smaller objects are invisible, and the masses alone distinct ; in addition to this, the edges of the reversed image are rather ill defined, and such as they would be if the surface of the reflecting medium happened to be a little agitated.

In proportion as one approaches a village, which appears to be placed in the midst of an inundation, the margin of the water seems to recede, and the arm of the sea, separating you as

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it were from the village, shrinks back by degrees : it at length disappears entirely, and the phenomenon which now ceases, in respect to the first village, is instantly reproduced by a new one, which you discover at a due distance in the rear. Thus every thing contributes to complete an illusion, which is sometimes cruel, more especially in the desert, because it tantalizes you with the appearance of water, at a time when you experience the greatest want of that element.

The explanation which I propose to give of the *Mirage*, is founded on some of the principles of opticks, that, indeed, apply equally to all the elements, but which it may be, perhaps, proper to explain here.

When a ray of light traverses a transparent and uniform medium, its direction is in a straight line. When a ray passes from a transparent medium into another the density of which is greater, if its direction in the first be perpendicular to the surface that separates it from the two *media*, this direction will not experience any alteration, that is to say, so long as the right line which the ray forms in the second medium, is a prolongation of that followed in the first. But if the direction of the incidental ray makes an angle with the perpendicular at the surface :

1°. The ray will divide in its passage in such a manner, that the angle which its forms, with the perpendicular in the second medium, becomes smaller; And

2°. In respect to the two *media*, whatever may be the extent of the angle which the incidental ray forms with the perpendicular, the sinus of this angle, and that of the angle of the refracted ray, are always in a correspondent *ratio*.

But the sinus of a large angle does not encrease so rapidly as that of a small one. When the angle, therefore, that is formed by the incidental ray, and the perpendicular happens to encrease, the sinus of the angle, formed by the broken ray, encreases in the ratio of the sinus of the former, and the encrease of the angle itself, is less than that of the angle of the incidental ray. Thus, in proportion as the angle of incidence augments, the angle formed by the broken ray augments also, but always by little and little; so, that when the angle of incidence hath arrived at its largest dimensions, that is to say, when it is within an infinitely small space of 90° , the angle which the broken ray makes with the perpendicular, is less than 90° : this is a *maximum*, or, in other words, no ray of light can pass from the

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first medium into a second, under a greater angle.

When the ray of light passes on the contrary, from a denser medium into one less so, it exactly follows the same line as in the first case, but in a contrary direction ; that is to say, if in the dense medium it has the same direction as the broken ray in the first case, it divides at the surface, and assumes the direction which has been also followed by the incidental ray.

In consequence of this it may be inferred that on the passage from a more to a less dense medium :

1°. If the ray of light be comprehended between the perpendicular and the direction of the diverging ray which constitutes the *maximum* angle ; this ray will project into the less dense medium.

2°. If the ray of light possesses the same direction as the diverging ray, the angle of which is the *maximum*, it will again issue forth, by making an angle of 90° with the perpendicular, or by remaining in the plane, which serves as a tangent to the surface. But if the angle which the ray of light forms with the perpendicular, be greater than the *maximum* of the angle of refraction, or what amounts to the same, if the ray be compressed

preffed between the surface and the diverging ray, the angle of which is the *maximum*, it will not leave the dense medium; it will reflect itſelf to the surface, and re-enter the ſame medium, by making the angle of reflection equal to the angle of incidence, theſe two angles being in the ſame plane, perpendicular to the ſurface. It is on this laſt propoſition that the explanation of the *mirage* is principally founded.

The transparency of the atmosphere, that is to ſay, the faculty which it poſſeffes of allowing the rays of light to paſs through with rapidity, does not permit it to acquire a very high degree of temperature by its direct expoſition to the fun alone; but when, after having traversed the atmosphere, the light becoming extinguiſhed by an arid ſoil, that ſerves only in a very ſmall degree as a conductor, hath conſiderably warmed the ſurface of this earth; it is then that the inferior *ſtratum* of the atmosphere, by its contact with the heated ſurface of the ſoil, contracts a very high degree of temperature.

This *ſtratum* dilates itſelf; its ſpecific weight diminiſhes; and in conſequence of the laws of hydroſtatics, it elevates itſelf, until by becoming cool, it hath recovered a density equal to that of the ſurrounding element. It is then ſucceeded

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by the *stratum* immediately above it, through which it passes, and the other soon experiences a similar operation. Thence is produced a continual efflux of rarified air, always elevating itself through a denser medium, that in its turn experiences a depression ; and this efflux is rendered sensible by the *striæ*, which alter and agitate the images of fixed objects that are situated beyond them.

In our European climates, we are acquainted with similar *striæ*, produced by the same cause ; but they are not so numerous, and do not possess such an ascensional rapidity as in the desert, where the altitude of the sun is greater, and the aridity of the soil, by depriving it of evaporation, does not permit any other employment of the *caloric*.

Thus towards the middle of the day, and during the greatest degrees of heat, the *stratum* of the atmosphere, in contact with the soil, is of an evidently less degree of density than the *strata* immediately above it.

The brilliancy of the sky proceeds merely from the rays of the sun being reflected in every direction by the transparent *moleculæ* of the atmosphere. Such of the rays of light as are transmitted by the more elevated part of the sky, and which descend to the earth after making a considerable angle

with the horizon, take a new direction on entering the inferior dilated *stratum*, and encounter the element on which we live, by means of a much smaller angle. But those that proceed from the lower parts of the sky, and form small angles with the horizon, when they reach the surface which separates the inferior and dilated *stratum* of the atmosphere, from the more dense stratum above, are unable to leave the latter; in conformity, therefore, to the principle of optics already alluded to, they reflect themselves in an ascending direction, by making an angle of reflection equal to the angle of incidence, as if the surface which separates the two *strata*, constituted a mirror; and they then represent to the eye placed in the dense *stratum*, the inverted image of the lower parts of the sky, which appear as if below the real horizon.

In this case, if you were not advertised of your error, as the representation of that part of the heavens perceived by means of reflection, is almost of the same brilliancy as that seen directly, you would imagine that the sky was greatly prolonged, and far nigher than it really is.

If this phenomenon were to occur at sea, it would alter the altitude of the sun, taken by an instrument, and augment it in the *ratio* of the quantity

quantity of the apparent limit of the horizon depressed.

But if some terrestrial objects, such as villages, trees, or little hills, give you notice that the limits of the horizon are more distant and that the sky is not really so near, (as the surface of the water is not usually visible under a small angle, but by the image of the sky which it reflects,) you will perceive the representation of the sky, and imagine that you behold a superficies of reflecting water.

The villages and trees that are at a proper distance, by intercepting a portion of the rays of light transmitted by the lower regions of the heavens, occasion so many voids in the image of the sky, produced by reflection. These voids are wholly occupied by the inverted images of the same objects, because such of the rays of light as are transmitted by them, and which form angles with the horizon, equal to those constituted by the intercepted rays, are reflected back in the same manner as those would have been. But as the reflecting surface which separates the two *strata* of air, of different densities, is neither perfectly level, nor perfectly motionless; the last images will, of course, appear badly defined, and agitated towards the edges, like those produced

by the surface of water which may have contracted slight undulations.

It is easily to be discovered why this phenomenon cannot take place when the horizon is terminated by an elevated chain of mountains; for those mountains intercept all the rays of light transmitted by the lower parts of the sky, and only allow those to pass above them which form sufficiently large angles with the dilated surface, to prevent the reflection from taking place.

In an uniform state, that is to say, by supposing that the density and thickness of the dilated *stratum* are constant, and the temperature of the superior *stratum* invariable, the greatest possible angle under which the rays of light could be thus reflected, would be determined with precision: for the largeness of this angle depends entirely on the immediate connexion between the sinus of the angles of incidence and reflection for the two *media*. But of all the rays reflected, those which form the greatest angle with the horizon, appear to issue from the nearest point to that where the phenomenon commences.

In an uniform state then, the point at which the phenomenon commences is always at a certain distance from the observer: accordingly, if he should happen to advance, the spot at which

the

the inundation seems to begin, appears to advance also in the same direction, and with the same celerity. If the line of march should, therefore, be directed towards a village, which appears to be situated in the midst of the inundation, the limits of the inundation will seem to recede insensibly from this village, and are soon after seen to stretch beyond it.

When the sun is near the horizon at his rising, the earth cannot have been sufficiently warmed; and at his setting, it has become too cold for the phenomenon of the *mirage*. It then appears to be extremely difficult to perceive both a direct and reflected image of the sun, on account of the elevated temperature of the inferior *stratum* of the atmosphere. But during the second quarter of the moon, that planet rises in the afternoon, a time when circumstances are more favourable to the *mirage*. If it then happens that the brilliancy of the sun, and the clearness of the atmosphere, should permit the moon to be discerned at her rising, two images of that planet will be observed, one above the other, in the same vertical line. This phenomenon is known by the name of *paraselene*.

The transparency of the sea allows the rays of the sun to penetrate to a considerable depth; its

surface from its exposition does not, however, become near so warm as an arid soil in the same circumstances; it cannot communicate, therefore, to the stratum of air that repose upon it so elevated a temperature; and on this account, the *mirage* is not so common at sea as in the desert. But the elevation of the temperature is not the sole cause, which under a constant pressure, may dilate the inferior stratum of the atmosphere. In fact, the air possesses the faculty of dissolving water, so far, even, as to attain the point of saturation without losing its transparency; and Saussure hath proved that the specific weight of the air decreases in proportion to the quantity of water kept in dissolution. When, therefore, any wind at sea is not impregnated with water, the inferior *stratum* of the atmosphere, which is in contact with the surface of the ocean, dissolves water anew, and thus becomes dilated. This cause, added to the slight augmentation of the temperature may, however, produce a state of things favourable to the *mirage*, which mariners, indeed, frequently observe.

This last cause, or in other words, the dilatation of the inferior *stratum* of the atmosphere, occasioned by the dissolution of a large quantity of water, may take place every moment of the

day, as well when the sun is near the horizon, as when he approaches the meridian. It is possible that a *parhelion* might then be produced, a phenomenon in consequence of which, either at the rising or setting of the sun, one beholds two images of that luminous body above the apparent horizon at the same time. But I never had occasion to observe this latter phenomenon, which is very unfrequent, or to remark the circumstances that accompany it. I therefore propose this latter explanation with a certain degree of reserve, and merely with an intent of furnishing the means of making useful observations.

ADDITION.

Since reading the above memoir, I have had frequent opportunities of observing the *Mirage* at land; this has occurred in various seasons, as well as under different circumstances; and the result, even including the minutest details, has always been in conformity to the explanation already given by me. Of all these observations, there is one only, the relation of which may prove useful here,

I was along with General Bonaparte in the valley of Suez, when he discovered the canal that formerly united the Red Sea with the Mediterranean. This valley, which is some leagues in

length, is bounded on the east by that chain of mountains that extends from Syria to Mount Sinai; and on the west, by the mountains of Egypt. These mountains are in general sufficiently elevated to exclude the rays of light transmitted by the inferior parts of the sky, and such of the rays as are not thus intercepted, reach the earth under too large an angle to be reflected by the inferior dilated *stratum* of the atmosphere. Thus in the hottest part of the day one does not perceive the reflected surface of any portion of the sky, nor is the appearance of an inundation any where to be seen.

Notwithstanding this, the effect of the *Mirage* is not entirely lost; the visible objects placed generally on an ascent, whose position corresponds with the inferior parts of the sky, the image of which reflects itself, participates in the effect, although in a less striking manner, on account of their small extent, and also with less force, because the colour is far more obscure than that of the sky. Independently of the representation produced by the direct rays of light, the rays which have emanated from these objects, and are directed towards the earth, become reflected by the inferior *stratum* of the air, in the same manner as the rays proceeding from the

inferior

inferior parts of the atmosphere, of which they occupy the place: thus producing a second image of these objects inverted, and placed vertically above the former.

This *duplication* of images produces optical illusions, against which it is proper to be on our guard in a desert that may be occupied by an enemy, while no one is at hand to give information relative to such alarming appearances.

I shall take advantage of this opportunity to mention another optical phenomenon, which is not sufficiently interesting to be made the subject of a particular memoir.

During our return from Egypt, when we approached the European climates, one morning a few minutes after sun-rise, the sky was clear towards the east; it rained at the same time in a western direction, and we beheld two ordinary rainbows; the one, interior, produced by a single reflection of the rays of light within the space where the rain fell; the other, exterior, occasioned by two reflections. At this moment both the sea and the atmosphere were perfectly calm, and the surface of the water, which was very smooth, reflected the image of the sun in a very discernible manner. This reflected image also gave rise to two other rainbows. The two first

men-

mentioned, which were produced by direct and descending rays, formed segments less than half the circumference; the two others, occasioned by the reflected and ascending rays, on the contrary, presented segments greater than 180° . Of these four simultaneous rainbows, the analogous ones had the same basis, and diverged like two segments of the same circumference of a circle, which had reverted on their common chord.

This phenomenon is only remarkable on account of the circumstances which gave rise to it; and it is sufficient to have mentioned it here*.

* The Arabs call this phenomenon *al-beidhat* the plural of *al-beidah*, the light, the splendor. (L—s.)

OBSERVATIONS

On the Wing of the Ostrich;

By Citizen GEOFFROY.

THE Ostrich, *Na'ameh*, in Arabic, inhabits the deserts of Africa: it is common also in the mountains situated to the south-west of Alexandria. This is a bird known in very ancient times, and which has given rise to many attempts at the marvellous, by attributing to it the faculty of digesting iron, and of hatching its eggs by placing them in the sand.

Its gigantic height, and astonishing conformation, have more justly attracted the attention of naturalists. They have been struck in an especial manner with a certain analogy between it and the camel: the ostrich, like him, reposes his cumbrous mass on certain bare and callous substances; it is the sole of all the numerous tribe of birds which possesses but two toes to each foot; and this fresh mark of resemblance with the camel, is one of the most singular facts relative to its conformation.

But

But the ostrich appears to appertain to quadrupeds, by other and no less important affinities: the male possesses the virile member, and the female has a clitoris, parts which are wanting in nearly all other birds; it never leaves the earth; like the quadrupeds, it is condemned, as it were, to traverse the surface with difficulty; and it is undoubtedly a very remarkable thing to see associated along with the inhabitants of the air, those nimble beings, for which motion appears to be absolutely necessary, both as a want and as a pleasure—a clumsy, heavy animal, precisely deprived of the principal prerogatives which distinguish and characterise its kind.

But it is still more surprising, that these derogations from a general law do not proceed from either the modification or degradation of a single member; if the ostrich does not ascend like other birds, this is not the fault of one or two, or even of three qualities, in the organs of flight, but because it is completely deprived of all the instruments destined for this exercise. Between the visible external parts of the wing, and the internal organs which appertain to it, there exists, in fact, a striking relation, which has hitherto escaped the notice of the curious, as the dissections made by them have been undertaken merely

merely with the view of obtaining a knowledge of the *viscera* of the ostrich.

The anterior extremities of this species, seem to induce me to believe, that nature hath, in some measure, proposed to create a bird, in which the organs of flight should be altered and modified to that degree, so as to be nearly entirely effaced; and as the figure of this animal is in part constructed after that of quadrupeds, with this difference, that a certain number of organs, and particularly the legs, are appropriated to flight, one is led to think, that in the formation of the ostrich nature hath fallen into a manifest contradiction. Let us not be eager however to blame so strange an anomaly; we ought first to learn how she has deviated from her ordinary road, and what are the means she has recurred to upon this occasion.

In order that the discussion of this question may be more easily undertaken, and that the difference between the anterior extremities of the ostrich and those of birds in general, may be more readily understood, I shall here present a description of these organs in quadrupeds; I shall afterwards examine them in respect to birds, and finally describe them in the ostrich.

The organs of running, or of flight, both in a
qua-

quadruped and a bird, are composed of three principal parts: the arms or wings, the muscles which put these in motion, and the bone to which the muscles are attached. In men and monkeys, who scarcely ever make use of their anterior extremities, but for the purpose of taking hold of something, and in quadrupeds, who use them for the purpose of motion, the points of fixation are incapable of affording any other than a middling, while the muscles possess but a small degree of strength and thickness: accordingly the *sternum* is cartilaginous in this family, and the pectoral muscle small. Nevertheless, so far as the efforts of the anterior extremities of these animals are concerned, the muscular fibres, and their appendages, are more than sufficient for that purpose.

It is not, however, the same in respect to birds, destined to skim through a very thin and light element, and with whom the anterior extremities perform the office of oars; now, in order that these oars may be enabled to agitate a greater mass of air, they stand in need of a greater degree of extension; thence proceeds the very great length of the anterior extremities of birds. So long a lever, intended to act on a light fluid like the atmosphere, requires, in its turn, a great moving

ing force, and the pectoral muscle is accordingly exceedingly thick and ample. Moreover, it becomes necessary that the *sternum* should be enabled to receive a muscle of so large a size, in a proportionate receptacle, and also to furnish it with very strong appendages: the *sternum* of birds is, therefore, so broad as to cover three parts of the belly. It is also entirely ossified, and towards the middle there is a considerable rising which traverses it in a straight line, and is known by the name of the *brechet*, or brisket. The muscle fills up the fissure which this projection forms on the *sternum*, while its hinder parts are attached in a solid manner to the *brechet*.

A bone, with which there is no analogy among quadrupeds, is called by the French the *fork*, and by the English, the *merry-thought*; it is in form of a V, and is placed before the *sternum*; the use of it is to prevent the wings when lowered, from approaching one another and thus compressing the breast.

In short, that nothing relative to the mechanism of flight may be omitted, I shall here point out the chief difference between the system of respiration in birds and quadrupeds. The lungs, instead of being freely suspended in a bag, as in quadrupeds,

quadrupeds, are adherent to the sides in birds, without any particular envelope, being pierced with holes, each of which opens either into a pouch or vesicle; the whole of the abdomen is full of these vesicles, which, by being inflated, considerably augment the volume of the bird, and thus render it specifically lighter.

If we proceed to the examination of the peculiarities presented by the ostrich, we shall observe :

1°. That its anterior extremities are far more short, in proportion, than in other birds.

(There is another species which, as well as the ostrich, never forsakes the earth : this is the cassowary, in which this fore-shortening is so very considerable, that no vestige of a wing appears on the outside. The form is not, however, entirely suppressed, for the various parts are found below the skin).

2°. The sternum of the ostrich is extremely small ; it forms nearly the sixth part of the length of the trunk ; it is destitute of the *brichet*, and is always found completely ossified, and even pretty thick : this great degree of solidity is employed to support one of the two callosities on which the animal supports itself when in a state of repose.

The second callosity is inserted at the *os pubis*, which, on this account, is prolonged considerably before.

3°. The pectoral muscle is still smaller than the sternum; it scarcely covers the third part of it: the middle of the sternum is filled with fat, which forms a cushion, as it were, for the anterior callosity.

4°. The air-vesicles, or portions of the lungs, are considerably reduced both in respect to number and capacity.

5°. It will be readily perceived that the ostrich stands in no need of what is commonly called the *merry-thought*, or that bone in form of a V, which is destined to prevent the wings from closing during violent movements. Nevertheless, this bone exists; but being divided towards the lower part, it is useless; each of its arms is joined by means of its anterior extremity with the bone, which is composed of the clavicle and the omo-plate, or shoulder-blade.

Although useless in the present case, those rudiments of the *merry-thought* have not been suppressed, because nature never proceeds by rapid strides, and always leaves the vestiges of an organ, even when it is superfluous, provided this organ has acted an important part in the other species of the same family. Thus the vestiges of the wing of the cassowary are to be found beneath the skin that covers the sides; thus, also, at the internal angle

of the human eye, there is a swelling of the skin which we recognize as the rudiments of the *nictant* membrane, with which many quadrupeds and birds are provided.

6°. I shall not add any thing to what is already written relative to the plumage of the ostrich ; it has been judiciously observed, that all the feathers are of the same kind ; that their beards or filaments consist of detached threads, without either reciprocal consistence or adhesion, and that the quills which compose the wing, far from being able, like those of other birds, to act in concert for the purpose of agitating the air, consist of longer and more slender filaments than the others. The plumage of this bird is the object of a considerable traffic, and when transported into Europe, is employed in distinguishing the gradations of military rank, and adorning the heads of females.

I shall not enumerate any more of the observations which the wing of the ostrich might give rise to : the narrow limits of this paper render it incumbent on my part to come to a speedy conclusion ; and in addition to this, I deem what I have already said sufficient to demonstrate the two facts intended to be established :

1°. That if the ostrich be reduced, in respect to

to motion, to the condition of quadrupeds, the cause is not to be attributed solely to the shortness of the wings, and the state of the plumage, but to all the organs, either employed directly or indirectly in flight, which are modified together, and as if it were in concert, so as to deprive it of the most charming prerogative appertaining to birds. And,

2^o. That whatever modifications the organs of flight may have undergone, these are not so important but that the bird is still recognizable, by certain indications of the general plan consecrated to this family.

OBSERVATIONS

On the Arabian Horses of the Desert.

THE horses of the Arabian race have been, at all times, distinguished on account of their excellent qualities, and admirable figures. They are generally esteemed throughout Asia; but there are certain tribes in the desert, in possession of the finest breed: these are the Arabs who live on the banks of the Euphrates, and the Tigris, between Bagdad and Bufforah. The Cheyks take great care to preserve these races uncontaminated, and without alteration.

The horses are divided into two classes; the nobles, and the plebeians: the latter are crossed in a variety of different manners, and form the most numerous species; but it is not intended to mention any other than the first. And here it will be necessary to make an observation on a singular custom, which appears in sufficient conformity with experience; it is, that the genealogy of the Arabian horses is transmitted by females alone: the nobility of the male is only individual.

The Arabs are accustomed to say, “ such a
mare

mare is the produce of such another mare ;" and they are at great pains to prevent the breed from being adulterated.

When the mares are in heat, they take care they shall be covered by stallions whose descent is well known ; and when they are sent to grafts, they are carefully tethered. No sooner is a foal produced than the chiefs attest the fact, by means of a patent drawn up in due form, and signed by several witnesses. That of the male, as we have already observed, does not pass to his descendants ; but that of the female makes mention of all her maternal progenitors. This certificate always accompanies the sale.

There are four distinguished races of the Arabian horses in the neighbourhood of Bagdad, the names of which I have forgotten. There is some difference in their form, which, of course, does not escape the notice of the jockies : as for them, they have no manner of occasion to peruse patents, in order to discover either if a mare be noble, or from what steed she comes.

The Arabs wean their colts after having suckled fifty or sixty days. When produced in towns, or when the proprietor is not desirous to rear them himself, the females are sent among the inhabitants of the desert. The usual mode of bargain-

ing on this occasion is, in their language, to give one foot of the mare, and sometimes two, or in other words, they pay to the person who has had charge of her, a quarter, or even one half of the value, according to an estimate made by experienced judges.

The Arabs carry on a great trade in horses; they sell them at two or three years old, and for the most part keep the mares, from which they derive considerable profit. It is also pretended that they prefer these, because they do not neigh, which would discover them during their nocturnal expeditions. The princes never mount any other; the Turks, on the contrary, make use of stone-horses alone.

The traffic in horses is not confined to strangers: they carry on a species among themselves which is singular enough, for they sell the *future produce*, without entirely alienating the possession. In consequence of this bargain the whole appertains to the purchaser, except the first filly, which reverts to the seller, but the former has still a certain claim on this first mare, as has also the seller on her first filly, so that these pretensions are continued for ages.

The Arabs begin to place the saddle on the colt at the age of fifteen or sixteen months; and it

it is never taken off after this, even during the night.

The stirrups, constructed in form of an oblong square, are about a foot in extent, and a little convex; they never hang lower than the belly, which prevents the animals from lying on one side.

They soon after experience another constraint, being obliged to submit to a snaffle, which is fixed pretty near the pommel of the saddle, to accustom them to hold their heads in almost a perpendicular direction; they are then left in this situation, during the whole of the day. It is also, perhaps, for the same reason that the manger is constructed both high and deep.

The Arabian horse is neither accustomed to hay, nor used to the manner in which it is distributed in Europe; his food consists of from five to six pounds averdupois of barley, which is given at sun-set. This custom renders him patient and indefatigable during the whole of the day. While kept under cover, he is permitted to amuse himself with a little cut barley straw.

It follows from what I have first said, that an Arabian horseman, carrying sixty pounds of barley behind him, can traverse the deserts during the

space of ten days. A few dates, and some pounds of wheaten meal, which he converts into bread constitute his sole food: these are carried by him in either a leathern or wooden box. Another of these, passing under his belly, and attached to the two skirts of the saddle, satisfies the thirst of both man and horse.

The Arabs, before they are two years old, begin by making their children mount their horses: they are perfectly well acquainted with them, as they are all brought up together under the same tent. They give them but two paces: the walk, and the gallop. They also cut the mane and shave the tail, that these may become more bushy.

The saddle necessarily leans forward, on account of the position of the horseman, whose stirrups are very short; they differ greatly, in this particular, from the Mamelukes of Cairo, and but little from our own light cavalry. It does not belong to me here to decide what kind of saddle affords the firmest seat to the horseman; but, on examining the arms of the Arabs of the desert, it would appear that the manner in which they fit is advantageous. They make use of javelins, which they keep underneath their thighs,

of

of lances, and of sabres. The management of these obliges them to be seated high, in order to use them to advantage.

The Arabs, as every one knows, make war both by attack, and flight. Their position in the saddle affords them an opportunity of leaning over the neck of the mare, to avoid the lance and javelin. They accustom them to gallop at full speed, and to stop all of a sudden, in order to wheel about with celerity, and dart the pike at the enemy. One of the greatest recommendations in these horses, being to know when to retire at the proper moment, they pursue them while young, with the lance at their posteriors, and they are so much accustomed to this management, that when they perceive a horseman near them, it is only necessary to let go the bridle, in order to be out of sight in an instant.

The lance of the Arabian horseman is formed out of Chinese bamboo, knotty, light and elastic, about twelve feet in length, terminating in an iron point well tempered, and surmounted by a tuft of silk: it is not immovable in their hands, as it was formerly in those of our ancient warriors; when they attack, they hold it within one third of

of the end, and allow it to glide along through their hands, without quitting it, however.

The Arab is so nimble that he will mount his horse, with the assistance of his spear alone.

These people have a most excellent custom, by means of which they preserve the feet of their cattle: when they have rode any distance, and the animal is in a perspiration, they never tie him up until he has been walked backwards and forwards, by a person holding the bridle, for a quarter of an hour; they afterwards leave him fastened to the saddle for an hour or two longer, before they give him any thing to eat.

The Arabs have a particular knack at making their mares conceive: when they perceive that they are beginning to be in heat, they mount them two or three days running, in order to fatigue them, and also diminish their ration of corn at the same time, with a view of rendering them feeble; in this they conform themselves to the opinion of Buffon: that naturalist supposes the females, which are the least vigorous, to be the best breeders.

The Arabs keep their stallions for the mares, and they consecrate those of from four to five years old to that purpose alone. They do not, in

in general, employ saddle horses on this occasion, as they become unruly in consequence of it.

The Arabs prepare the mare before they bring forth the stallion: after having tied her by the feet, and taken off her hind shoes, the farrier takes a bit of soap, which he introduces into the vagina; he anoints it with this as deep as possible, and also sets the entrance of the matrix straight, should he perceive it to wind. I have been assured of a fact, which I cannot yet believe: it is, that when they find a mare to be barren, they even remove the matrix out of the vagina, scrape the small black points which they perceive there, and sometimes actually sow up little holes. As soon as the stallion has left the female, they immediately throw a bucket of water over the hind parts, and make her gallop, by means of a person who runs along with the halter.

It is easily perceptible at the end of three or four months, whether the mare be in foal. Here follows an account of what I myself have seen practised: the flank of the animal is presented to the sun, and when it becomes warm, cold water is thrown over the belly, and thighs; and the contraction experienced by the mother, in consequence of this operation, being transferred to the matrix, causes the foetus to move.

Every Arab possesses a horse, which he maintains at a trifling expence. The price varies according to the quality; the plebeians are sold at, from fifty French livres, to one hundred and twenty a piece, while young; those of distinguished birth, at from one thousand, to ten thousand livres. In respect to the mares, which are always one third dearer than the stallions, those considered as very valuable are never disposed of entirely, as the proprietor always takes care to stipulate for the reservation mentioned above.

Such of the Arabian horses as are kept in towns, display much grace and elegance: those of the desert have an humble air, and are very lean: a well fed animal would not be of any service to his master, during a long and perilous expedition.

Lightness and celerity in running, of course, constitute a grand difference in respect to their cattle; but notwithstanding all the fables, and vaunting of the natives, they do not possess the same quickness of motion as the race-horses of Europe: these traverse an extent of ground equal to two thousand yards in the space of four minutes, which is tantamount to three-fourths of the flight of the swallow.

The height of the Arabian coursers is not so great,

great, in general, as those of the French; but it is more uniform: they greatly resemble the cattle of the Limousin, in every thing but the hind quarters, which are more plump:

The Arabian horse is remarkable for the smallness of his hoof, and the soundness of his legs. He is to be found of all colours, black only excepted.

*Account of the prevailing
OPHTHALMIA OF EGYPT,*

*By Citizen BRUANT,
Physician in Ordinary to the Army.**

Head Quarters at Cairo,
15th Fructidor, 6th Year.

ALL the travellers of the medical profession, who have written on Egypt, have spoken of the ophthalmia (inflammation in the eyes), so frequent in this country, in a vague and inaccurate manner: and yet this disorder, which is always troublesome, is often followed by serious consequences, and to this cause alone is to be attributed the frequency of blindness throughout Egypt.

In the inflammation of the eyes, which is now prevalent in our army, we have not been able to discover any established facts, capable of regulating our treatment of this disorder. Our practice has, hitherto, been merely founded on the actual

* This account is taken from the correspondence of Citizen Desgenettes, principal Physician to the army.

state of the patient, the previous circumstances of the disorder, or sometimes simply on the general indications of the *juvantia* and *lædentia*, in similar circumstances.

The greater part of our patients affected with this inflammation, have come from the advanced posts and encampments; all of them have been more or less exposed to the united action of excessive heat and light, which may be here regarded as one of the principal causes of this disorder. To these may be added others no less powerful, among which the chief is, as Prosper Alpinus has observed, that scorching nitrous dust which the winds are constantly raising in clouds in the atmosphere. All these causes unite in making the ball of the eye a center of irritation, and consequently of inflammation. As the operation of these predisposing causes is constant, and varies little at any season of the year, the disease which they produce prevails at all times, but principally during the three months which precede the inundation of the Nile, at which time the necessary labours of agriculture fully employ the inhabitants, and expose them more directly to the influence of the circumstances which I have just mentioned. Hence it is that the ophthalmia is at that season but little to be found

found among the natives, whilst it attacks our soldiers in great number, who are obliged to make laborious marches, or who live in camps disadvantageously situated.

The greater number of the instances of ophthalmia which come under our care, originate from local circumstances of this kind; there are, however, others produced by more remote and general causes of diseases; as for example, we have met with some that evidently originated from a load of acrid bilious fordes in the primæ viæ. These are not easily distinguishable from the others, for often the symptoms of foulness of stomach are at first obscure, and do not assume a decided character till after the operation of an emetic: the most certain indications of inflammation of the eyes from this affection of the stomach are, an irregular headach, a thirst more or less constant, and a yellowness in the tongue and inflamed parts.

Again, there is a third species of ophthalmia which we have remarked, and which will not range under either of the two former kinds, that principally attacks persons of a delicate habit; those who are weakened by a long continuance of sickness, and are only convalescent, and these are often thereby detained for a long time in the hospital.

hospital. In these species of ophthalmia the inflammatory symptoms are but indistinctly marked, there is little or no swelling; but a number of nervous symptoms are to be observed, such as violent spasms in the eyelid and the parts contiguous to it, which causes a great increase in the secretion of tears. The eye itself, is at the same time highly susceptible to light, and the eyelids strongly approach each other.

These differences in the symptoms and predisposing causes, it is obvious, must considerably modify the diagnosis in this disease. In general, however, it may be described in the following manner: it comes on all at once, and during a state of perfect health, it begins by a sharp pain in the eye, accompanied with much watering; the eye supports the light with difficulty; soon after the vessels which surround the tunica conjunctiva swell, and render the motion of the eyelids painful and difficult. As the disorder advances, the conjunctiva itself, swells and becomes puffy; it rises above the transparent cornea, which then appears as if sunk in; and the swelling and inflammation soon extend to the eyelids, and their motion is interrupted. At last the symptoms, little by little, abate of their violence, the swell-

ing of the eyelid disperses, and the eye opens : it then appears covered with a whitish matter, perfectly resembling pus, which collects constantly at the inner angle, especially during the night, which causes much difficulty in opening the eye in the morning : by degrees it acquires a purplish tinge, and at last returns to its natural colour and appearance.

In the height of the disorder the patient often experiences violent pains, either extending all over the head, or only confined to the arch of the eyebrow. The pulse is a little encreased in quickness, and the eye has always a great sensibility to light, and the rays of the sun give a painful impression : the faculty of seeing is encreased, as happens in the greater number of the pathologic affections of this organ that are connected with great irritation. Towards the decline of the disease, however, the patient sees objects in a confused manner, as if through a mist, and besides, experiences many of the symptoms which attend an incipient amaurosis.

The duration of this ophthalmia varies from eight to thirty days, or even more, according to the concomitant symptoms, and the consequences of the disorder. These are, for the most part, weakness,

weakness, and indistinctness of vision, and sometimes small ulcers over the whole extent of the albuginea and cornea.

The most important object of enquiry on the subject of this disease, would be to find out a method of prevention; but it is almost impossible to seclude the body from the influence of those external causes of disorder which are constantly present; all that can be done, is to moderate their action in the most favourable manner. Whatever be the means proposed for this object, they should be expressly insisted on, and on that account, should be so simple and easy of application, that the soldier may make them a part of his regular duty, which he will neither neglect nor omit. Among the best prophylactics, may be reckoned frequent washing of the eye with cold water, from which I have experienced the happiest effects in a beginning ophthalmia; and on that account, I doubt not, that it would be still more efficacious as a preventative. This has, too, the capital advantage over other methods, in being applied with the utmost ease, and yields to none in virtue.

The disorder which we are speaking of very often cures itself by the spontaneous efforts of nature, and without having recourse to art; and

one may say, with truth, that nothing so much stands in the way of a cure, as a multiplicity of remedies, especially external applications. Some of our patients have been relieved by an eruption coming out upon the temples; and others, the greater number, by a slight diarrhoea; and it is conformably to these natural indications that I endeavour to keep the bowels open during the whole of the disorder, by decoction of tamarinds, and other such laxative ptifans.

Our treatment has varied according to the different species of ophthalmia which we have distinguished: I shall point it out in a few words. When the disorder is merely local, and the inflammation not yet established, we employ with success the cold lotions which I have mentioned, and repellents of every kind. Bleeding from the arm would, in such cases, promise much advantage; but the decided bilious character of the greater part of these disorders, have prevented us from having recourse to this evacuation: besides, it is strongly counter-indicated in our soldiers, weakened as they have been by a long warfare.

Topical bleeding, which, however, we have not hitherto been able to administer, would, probably, be as certain, and more favourable in its operation than general bleeding; at least we have

have, in favour of this opinion, the example of the inhabitants of the country, who take blood from the corner of the eye with success: this practice must, at least, moderate the violence of the symptoms when the inflammation is at its height, and must, therefore, necessarily run through its regular stages. Hitherto we have confined ourselves to removing from the eye every irritating cause, and especially light. When the pain is very violent we apply a few emollients, but sparingly, because the relaxation which they occasion would render the swelling very obstinate, and much retard the cure. The application of a blister to the nape of the neck is, besides, more serviceable in this case, especially when the pain is not confined to the eye, but spreads over the greater part of the head. As soon as the violence of inflammation abates, we have recourse to resolvent collyria, which we gradually render stronger, and thus complete the cure.

When the symptoms indicate that the ophthalmia arises from a disordered stomach, evacuants must immediately be resorted to. I have already observed that the first emetic has often no other effect than to render this complaint more strongly marked; it is therefore necessary to ensure success to administer a second emetic:

often, too, we are obliged to evacuate the bowels, which I do by adding a few grains of jalap to the other purgatives. This mode of treatment must be continued daily in these stomach complaints attended with inflammation of another organ; they require the more active evacuants, except particularly counter-indicated. In the ophthalmia which we are now considering, the stomach affection is sometimes, however, only a symptom which accompanies the idiopathic disease, and runs its course after the original disorder is worn off: it requires the same plan of treatment as is mentioned above.

In the third species of ophthalmia which I have laid down, along with tonics employed internally, I join the use of external antispasmodics: I have found none more powerful than blisters, which therefore, in these cases, form the principal remedy, whilst in the truly inflammatory ophthalmia they are only indirectly useful. Their good effect is the most certain when applied behind the ears: this too is the place where the Egyptians apply the actual cautery, when they employ this remedy for ophthalmia of long standing, and other inveterate disorders of the eyes.

EXTRACT OF A LETTER

From Adjutant-General JULIEN to Citizen GEOFFROY, Member of the Institute of Egypt.

Rosetta, 20th Vendemaire,
Year 7.

YOU ask me, citizens, to send you more particulars concerning an observation which I have had occasion to make relative to the method of making oaths in Egypt. It is but little that I have to add; but the least particulars being interesting to the impartial observer of the manners and customs of a people so remarkable, and so little known as the Egyptians are, it is with pleasure that I transmit you any particulars.

When the Mamelukes appeared before us for the first time at Bahhmanyeh, our advanced guard stopped an inhabitant of the country who was crossing the plain: the soldiers who detained him asserting that they saw him come from out of the enemy's ranks, looked upon him as a spy, and treated him rather roughly. On meeting with him, I ordered him to be conducted to head-quarters, but without doing

ing him any injury. The poor fellow, encouraged by what he saw of my manner of speaking, endeavoured to convince me that he was not an adherent of the Mamelukes, and spoke with great vehemence, following up his words with very expressive gestures; but as I had no interpreter, he saw that I could not comprehend what he said. He then took up his blue shirt, and holding his *phallus* in his hand, he remained a few moments in that theatrical attitude, like a god swearing by Styx, and by his countenance he seemed to say, "After the terrible adjuration that I have made, dare you any longer doubt my innocence and veracity." His gesture called to my recollection, that in the time of Abraham the truth was sworn to by taking in the hand the organs of generation.

This ancient custom, preserved still among the modern Arabs, is not the only one: the more one studies the manners of this half-savage people, the more light is thrown on the history of the Old Testament; and thus events, which have been regarded by some Europeans as supernatural, because only extravagant, are easily explained, and one learns how to appreciate properly the merits of the heroes of the Mosaic history.

It may be also observed, that the example just mentioned

mentioned is not the only one in which the Egyptians depart from what we esteem the rules of decency; they appear extremely severe with regard to the manners of their wives and daughters, and yet they care very little for discovering what we conceal with so much care. The most grossly licentious songs, and the most disgusting dances, are the amusements which, in the privacy of their habitations, a grave musulman procures for his family.—Explain, who can, these whimsical contradictions.

DESCRIPTION

Of a new Species of Nymphaea.

*Read at the Institute by Citizen SAVIGNY, on the
6th Vendemiaire, year 7.*

AMONG the aquatic plants whose blossoms, by their brilliance, their richness, and their varied colours, compose the most striking ornaments of our brooks, our rivers, and lakes, there is a small family with the following natural characters:—Their stature is generally low, their roots long, the leaves usually radical, sometimes floating on the surface, sometimes entirely submerged; the flowers are perfect, with a divided calyx, and many petals; the stamens inserted in the pistil; the seed-bud, generally inferior, terminated with styles, or merely with stigmata. These plants are ranged among the unilobate, because their seed is a single cotyledon, or if there are two, one is very small, and scarcely perceptible.

Of all the genera which this family comprehends, there is none whose flowers exceed in size and

and beauty those of the genus *nymphæa*. The different species of which it is composed are readily known by their numerous petals and stamens, by their sessile stigma forming a large radiated disk, and situated immediately on the summit of the seed-bud, and lastly, by their dry seed-vessel, divided into many cells, each of which incloses several seeds. Of this genus there are only two species in Europe, both of which are found in the neighbourhood of Paris; and probably no one has ever walked on the banks of the Seine, or in the low, marshy meadows that border it, without admiring the large blossoms of the yellow water-lily, or those still more beautiful, and still more splendid, of the white water-lily. Egypt, as we shall see, has, in this respect, no reason to envy the countries of Europe.

In fact, from the time that the Nile begins to rise and overflow, to that of its compleat retiring, the whole surface of the canals, the river, and almost all the inundated land, is enamelled with flowers, whose magnificent blossoms of white and blue charm the eye with their splendour, and fill the air with their agreeable perfumes.

These flowers belong to the two species of *nymphæa*, which are indigenous in Egypt. The first,

first, called by Linnæus, *nymphæa lotus*, has long been celebrated by historians and poets; all travellers, ancient and modern, have paid it the tribute of their praise and admiration. Savary, in his Letters on Egypt, often introduces it to embellish his pictures; it is also equally well known by systematic authors, most of whom have characterised it in a very satisfactory manner.

The same has not been the case with the second species, namely, that with azure blossoms: few travellers seem even to have noticed it; and the description of those who have mentioned it is singularly vague and obscure. Forskal, who visited Egypt in 1761, and who gave a very full flora of the country, does not seem to have observed it; and his silence in this respect is the more surprising, as the plant in question always grows by the side of the *nymphæa lotus*, seeming to delight in mingling its blossoms with those of its kindred species. It is not even mentioned in the last edition of the *Systema Naturæ*, published by Gmelin, notwithstanding the care of this author in collecting all the species which are dispersed through different publications.

It became therefore a *desideratum* to give a name and specific character to this *nymphæa*, as well

well as an exact description, and thus to enrich botany with a new plant. To effect this is the object of the present memoir.

As, however, this species has many points of resemblance with the *nymphæa lotus*, and since it is not impossible that they may have been often confounded, it will be better to describe them comparatively, since thus the peculiar specific characters of each will be rendered more obvious.

The root of the *nymphæa lotus*, and of the other species, which, from the colour of its corolla, I shall call *nymphæa cærulea* (blue water-lily), consists of a bundle of long fleshy white filaments, to the upper extremity of which are attached a number of round tubercles. In many of the provinces of Egypt these tubercles, especially those of the first species, are dug up and used for food ; they are, however, dry, earthy, and unpalatable.

The leaves of each species are large, numerous, sub-rotund, divided into two lobes from their base to the insertion of the leaf-stalk, that is, to about the centre of the disk. They are thinner than those of the European water-lilies, of a deep green, shining on the upper surface, and often tinged with purple on the under one. The leaf

leaf-stalks are radical, cylindrical, slightly compressed, and long enough to allow the leaf to float on the surface of the water.

The flowers are very large, often more than four inches in diameter; the peduncles spring from the root, and are each terminated by a single flower.

The calyx is composed of eight leaflets, arranged in two circles, and coloured on the inside; those of the inner circle are the most coloured, and somewhat resemble the petals. These last, to the number of from twelve to twenty, are also disposed in several series. The stamens are yellow, with large petaliform filaments. The rays of the stigma vary in number from twelve to twenty-five; they are of the same colour as the stamens, compressed, and slightly inflected at the summit.

Such are the common characters of the roots, leaves, and flowers; the following are the chief specific differences.

The leaves of the *nymphaea lotus* are surrounded with a sharp, stiff, almost prickly serrature: their lobes are generally exactly parallel; their inferior surface is overspread with prominent fibres; and the leaf-stalks are hispid.

Those

Those of the *nymphæa cærulea*, on the contrary, are scarcely waved at the edges, and their lobes are more pointed and divergent. The inferior surface presents very few fibres, of which the largest alone are slightly prominent, the others being indented: the leaf-stalks also are perfectly smooth.

In the *nymphæa lotus* the flowers are always more expanded: the leaflets of the calyx are ovato-lanceolate, greenish on the outside, without spots, but marked with seven pale very distinct striæ.

In the *nymphæa cærulea* the leaflets of the calyx are narrower, lanceolate, almost wedge-shaped: their outer surface is of a deep green, variegated with dots and striæ of a dark purple.

The petals of *nymphæa lotus* are ovato-lanceolate and very unequal, the interior ones being much smaller than the rest; their colour is a pure milk-white, rarely streaked with purple; and green on the outside.

In the *nymphæa cærulea* the petals are all equal, lanceolate, of a brilliant white, tinged, especially at the extremities, with the most beautiful azure, sometimes slightly tending towards violet.

The stamens of the *nymphæa lotus* have very compressed lanceolate anthers, without any appendage to the summit, and scarcely of the length of the filaments.

The anthers of the *nymphæa cærulea* on the contrary are linear, but little compressed, and longer than the filaments; the summit is also terminated by a bluish awl-shaped appendage similar to a small petal.

Lastly, the rays of the stigma are longer and more awl shaped in the *nymphæa lotus*; and shorter and ovato-lanceolate in the *nymphæa cærulea*.

The odour of each species is also different; that of the *nymphæa cærulea* being extremely mild and sweet; whereas that of the *nymphæa lotus* is strong, pungent, and much less agreeable.

The fruit offers no specific differences, being in both a dry round capsule, covered with the bases of the petals and leaves of the calyx, truncated and radiated at the summit, and divided into several cells, each of which corresponds to a ray of the stigma, and incloses several small round rose-coloured seeds.

The Arabs well know the difference between
the

the two species, having given a name to each: the first they call *neoufar*, and the latter *bachenyn*.

From the above description the following specific characters may be selected.

NYMPHÆA LATUS; *foliis dentatis, antheris apice simplicibus.*

NYMPHÆA CÆRULEA; *foliis repandis, antheris apice subulato-petaloideis.*

REMARKS

On the Topography of Menouf, in the Delta.

By Citizen CARRIE, Physician in Ordinary to the Army.*

MENOUF, capital of the Menoufyeh, is situated on the side of a canal formerly navigable, but which has ceased to be so since the necessity of making a strong dyke across it at the distance of three leagues from the town, in order to restrain the water, which flowed into it in too great abundance, and thereby injured the irrigation of the lands on the branch of Damietta. This canal surrounds the walls of Menouf from south to west.

Menouf is ill built, the houses are very mean, the streets narrow and crooked, as is the case in all Egypt: there are comparatively but few remains of antiquity.

Beyond the walls of the town, there is a circle of hillocks, composed of ruins and mounds of earth, which impede the view to such a degree as to entirely obstruct the view on the east and west.

* These remarks are extracted from the correspondence of citizen Desgenettes, principal physician to the army.

Near

Near the south gate is a leaky canal, not more than two or three toises distant from that which has been just mentioned; the space between them is taken up with the road into the plain. A little farther on is an elevation, on the top of which is a *santon* *, and at the bottom, close to the great canal, is an old mosque. On the right of the gate to the east are several pits for soaking flax, the vicinity of which is both disagreeable and unhealthy. To the south-east is a burying ground, and on its right some more flax-pits. On the east are other flax-pits, but in a state of neglect and ruin, and full of stagnant water.

The north offers nothing remarkable; there is only a grove of palm trees by the side of a bad well; which from its position seems to have made part of a garden, the remaining trees of which were cut down for fuel before our arrival.

On the west, at some distance from the city, flows the canal of Menouf, and here also is a burial ground and the ruins of an old mosque, within the enclosure of which are a few scattered *santons*, surrounded with trees. To the south-west, in another palm-grove, and also a few *santons*.

* A piece of wood on which the Turks suspend utensils for heating their food, &c.

There are no gardens in Menouf and its vicinity, though all the circumjacent villages contain them, so that all the fruit and vegetables sold here except dates and a few pot-herbs come from a distance. The principal crops in the neighbourhood are wheat, barley, maize, called here *dsourah*, beans, lentils, and lupins. The maize-harvest which is the only one that I was present at, happens from seventy to eighty days after seed-time.

Water melons, cucumbers and melons are also raised, but in small quantity.

The animals used in husbandry are oxen, buffaloes, camels, horses and asses : there are however but few horses employed.

During the inundation, Menouf is surrounded with water, but it remains a very little while, except in pits and other low places. This is doubtless the reason of the healthiness of the town, especially on the north. It has also the advantage of shelter from the south winds, while its open exposure to the north and northwest keeps it moderately cool.

The population does not exceed four or five thousand inhabitants, though it is usually estimated at double that number.

The prevalent diseases are in general the same
as

as those which afflict the rest of Egypt. The plague, according to the report of the inhabitants, does not commit very great ravages here. The number of deaths last year did not exceed forty, and sometimes it is even still less.

The manners, customs, and mode of life in Menouf offers nothing remarkable, as far at least as I was able to perceive. The common drink is the water of the Nile.

Those men who are employed in cultivating the ground, are strong but meagre; those on the contrary who are engaged in sedentary occupations, especially the weavers, who form a numerous body, are fat. It happens very unfortunately that excessive corpulency is here esteemed a beauty.

The children, till the age of five or six, are emaciated and feeble, with a pale or yellowish complexion, a swelled belly and general bloatedness, arising from an enlargement of the mesenteric glands. This is in part to be attributed to the indigestible food which their mothers give them while they are suckling and after they are weaned; the great mortality among the children, originating from this cause, would threaten the total extinction of the population, if it were not for the extreme fecundity of the women, from

which there results a balance, even with all these disadvantages, in favour of life. Those who could introduce and reduce to practice in this country a rational treatment of children, would render a great benefit to the human race.

I have no observations to make on the natural or moral constitution of the women, the custom of the country not allowing any opportunities of observation.

AN ARABIAN ODE

On the Conquest of Egypt. Translated from the Original.*

By Citizen J. J. MARCEL.

THE ancient Arabs, says Ssefady†, derived their whole glory from three things, which they esteemed above every thing else, military prowess, the exercise of hospitality, and a talent for literature.

This peculiar esteem for the cultivation of letters among the Arabs, was a consequence of the constant advantage which they derived from poetry ; it was this which served them for histo-

* The author of this Ode is named *Nickoula el Tourk ebn Youcef Ethanbouly*, he is a native of Beyrouth, and appears to me to possess a far greater extent of information on literary subjects, than I have hitherto met with in any inhabitant of this country.

† El a'reb quadymân mâ kâna lehâ mâ tefetkher bihi illé êl-séïf oué êl-dhéïf oué êt-belâghet.

rical commentaries, by this they preserved the memory of family genealogies and of illustrious actions, and the martial feats of celebrated warriors were thus consecrated to fame in odes, (*el quassy-deh*) and in poems, (*el phamaceh*) which were eagerly committed to memory, and transmitted from mouth to mouth, and from age to age.

Every year an assembly of Arabian poets met together at Mecca, which continued together a month. Their meetings were held in public in the midst of the union of all the Arabian tribes and people who annually resorted in numerous caravans of pilgrims to the sacred and opulent city of Mecca, which then enjoyed a celebrity equal to the ancient Delphos of the Greeks.

The poets there produced their best works, and the prize was decreed to him who was unanimously judged to bear the palm from his competitors. Happy was the orator in these contests ; his name was inscribed on the columns of the temple*, and at his return his tribe decreed him the honour of a triumph.

Arabian literature was in its earliest age simple

* His work written in characters of gold upon silk, was hung from the walls of the *Ke'abeh* (the temple of Mecca).
and

and divested of ornament ; the language partook of the rude manners of the savage state, and the people among whom it originated ; but at the same time, in proportion as the Arabs were in a state more approaching to that of nature, their thoughts were stronger and more energetic, their style richer in ideas than words, and their expressions loaded with metaphors which often appeared exaggerated, because they were not familiar with those gradations and shades which cultivated nations have introduced in painting their ideas. The language afterwards became polished, and freed from its rudeness at the time when the conquering Arabs made themselves acquainted with Greek literature. By forming their style on the model of the excellent works in this language, and translating them in their own, they purified their taste and refined their native tongue.

However, even at this period the imitation of the Greek poetry by the Arabian authors was not servile : in receiving a spirit of order and regularity from the Greeks, the poetry of the Arabs has preserved its original tone, and that characteristic shade of difference which distinguishes it from that of every other nation. Its demeanour is entirely its own, it preserves its own manner

ner of thought, of expression, of arrangement of ideas.

The love of poetry is still alive among the Arabs: it has flourished from generation to generation down from the earliest antiquity, and their historians in every period constantly mention a great number of poets who have flourished in different ages.

Even at present, the Arab of the desert, and the Yemen, entertain as high a respect for their poets, as for their warriors. Men reposing in their tents from fatigue and the heat of the day, often one of them rises, and like the northern bards begins to recite with enthusiasm the heroic deeds of ancient heroes, or the funeral eulogy of warriors slain in battle: immediately the surrounding audience shake off their drowsiness, form a circle round the orator, whose words they say, "flow sweeter than honey"—nothing can then distract their attention from the charm which captivates their souls, except the animating cry of war.

The following ode was composed soon after the conquest of Cairo; the pleasure which it gave me, made me wish to translate and publish it. Perhaps my friends will partake of these sentiments,

timents, and if they discover in it some few sparks of genuine poetry, they will think the Arabian muse not unworthy of occupying a small place in that literary empire which has hitherto been exclusively devoted to Europeans.

Transcript

*Transcript of the Arabian Ode, conformably to the
Harmonic Alphabet of Citizen L—s.*

AT length the dawn of happiness breaks upon us; the time destined by God has arrived; an atmosphere of felicity surrounds us; the resplendent star of victory which guides the French warriors has shed upon us its dazzling light; fame and renown go before them; fortune and honour accompany them.

The chief who marches at their head, is impetuous and terrible; his name terrifies kings; princes bow their haughty heads before the invincible Bonaparte, the lion of battles; his courage sways irrevocable destiny, and the heavens of glory are prostrate before him.

All must yield to his might! Woe to whoever lifts up against him the standard of war! To declare enmity to him is to bring on inevitable ruin: he humbles before him the mighty who resist him, but his generosity to vanquished nations is a sea that knows no bounds.

Phœnix

Transcription de l'ode Arabe, Conformément à Alphabet Harmonique du Citoyen L—s.

LILLAHI a'ffroun zahâ * félék èl-sa'âdet fyhi
dâr

Oue djémâl kaoukéb dévlét âl-*djéïch èl-Fran-
çâouy lihâ ânâr

Yâ hhusnhâ min dévlétin * bêl-êstekhâr lihâ
échtéhâr.

Meqéddâmhâ dsou fathouatin * téhday èl-mou-
louk léhou él-ouéqâr.

Al-chehem Bounâpârtèh âçâd * él ouéghâ dsou
él-îqtidâr

Men fâq qadrân oué êrtiqay * êvedje él-eu'lâ oué
samâa él-fékhâr.

Mâvalay chédyd él-batech * men a'âdahou hheull
bihî él-démâr

Mélikoun téouéllay rétâbân * khadh'at lihâ él-
quom él-koubâr

Mévalay a'mym néouâlihi * bahhroun tenezzeh
a'n quozâr.

Phœnix of his age ! he has every where scattered terror by his more than mortal activity, and the astonishing swiftness of his conquests. Victorious over kings leagued against him, a new destiny awaits him, he prepares new triumphs. Immediately at his orders his unwearied legions throng to his standard, at his commands the astonished sea is covered with a multitude of ships.

Alexandria, in spite of the obstacles that oppose him, cannot withstand his assault ; Mohharrem * sees him enter her gates victorious. Mohharrem ! happy month, thou openest the year with glory, and addest to thy honours that of leading the French heroes to their career of triumph. Cairo soon beholds the conquering army, exulting in its new trophies, inundate her plains and scale her ramparts.

Every young warrior burns with impatience to signalize his valour. Bonaparte disposes his war-like squadrons like an able general, and prepares for the attack : he displays the most consummate skill in the art of war, the fruit of reflection and long experience.—Instantly at his orders his battalions rush forward with impetuosity, and with a rapid course charge the presumptuous Mamlukes.

* Mohharrem is the first month of the Heira.

Then

Nedboun téouahhadd bêl-ouaray * béchehâmé-tin dsât eu'itibâr

Qahara êl-mémâlek djemmmétan * oué qadhyâ êl-morâd bémâ âchâr.

Oué âtay bédjéïchin ouâférin * oué mérâkébin théouat êl-bahhâr.

Oué témellek êl-êskendéryeh * fer'âtan doun êu'itiçâr

Bé Mohharremin chehroun bihi * hhaçan iftit-âhhin oué êntachâr

Oué mélâ êl-ârâdhy a'fkérân * hhaoul êl-kinâ-néti oué istidâr.

Min koull ssodâtin oué fétay * youm êl-qéttâl ~~h-~~
hou ifsthibâr

Sseff êl-ssoufouf béhhikmétin * oué fénoun hhar-bin oué êkhtibâr

Oué fethâ bêcheddét a'zmehou * a'lay djiouch
êl-ghouzz † ghâar.

† *Gouzz* is the generic name by which the Mamlukes are generally distinguished in Egypt. The Arabians have taken the term from *Ghuz* or *Ghouje* the name of a Turkish

(or

Then the battle glows like a fiery furnace, the din of arms spreads terror afar off, and congeals the soul with dismay: the very infant who, in the midst of common battles, knows not what it is to fear, now feels his hair bristle and bleached with fright. Soon the beys tremble and are discomfited, they drink deep of the cup of bitterness, and their harrassed souls fall a prey to despair at the event of this disastrous day.

O ever memorable day! O God! preservé us from being again spectators of so dreadful a battle. This innumerable multitude, armed by the beys for their defence, half cut to pieces, retire dismayed into the deserts. Death pursues their devoted heads, as if heaven, irritated by their crimes, had rained upon them its avenging flames.

In this general disaster each chief and each soldier has no other wish than to fly far from a land which their tyranny has rendered inhospitable to them; a black despair weighs down their funken spirits, and misfortune for ever becomes a companion to their steps. Bonaparte triumphs, and the defeat of the Mamelukes has decided their fate for ever.

Their

Oué âtçâr nâr èl-hharb fy * youmin techyb bihy
êl-ssougar

Oué léouay êl-ei'n âna'léïhoum * oué faqâhoum
kâs êl-mérâr

Oué ârâhoum youmân chédyd êl * hharb fyhi êl-
a'ql hhârr.

Youmoun youqâl behhaqîhi * lillah derrak min
nihâr

Oué tébeddedét tilk âl * djémâhyr êl-a'dydet fy
il qefâr

Oué râou âl-ményét fouqhoum * qad êmtherét
djemrât nâr.

Oué él-béthech minhoum oué âl-fétay * thaleb
êl-hazymet oué êl-firâr

Oué êl-kerb hhall bihim oué hhâq * êl-ouyl fy
tilk êl-dyâr

Oué îtitizz Bounâpârteh * oué èl-ghouzz ouéllét
bénkiçâr.

(or Tartar) nation, who are “ intrepid, rapacious and
cruel,” according to Castell, *Lexicon Persico-latinum*, page

Their power is rooted out, and their princes, dispersed and humiliated, have no other course to run than that of misery and disgrace. Cairo opens her gates and receives the victor in her bosom. The will of God is accomplished, and the second month Sfafar * sees the glorious completion of the triumphs which begun with the rising year.

403. The Egyptians and Arabs have given this name to the Mamlukes, not so much to denote the country from which they originate, as they are bought while children from different countries, as to express the contempt and hatred which they bear for them. In fact, the name of *Turk* or *Tartar*, which is synonymous, is the most cruel reproach that can be uttered by an Arab or Persian. This is the reason why the subjects of the Grand Seignor, whom we generally call *Turks*, because they originated from Turkestaw, a province of Tartary, reject the appellation with disdain, and only acknowledge that of *O'tcmanlou*, or as we call it *Ottoman*, that is to say, subjects of Othman, the founder of this empire in about 1300. (L—s.)

* Sfafar is the second month of the Mussulman year. This year it corresponded with a part of Messidor and Thermidor.

Oué techtétét ômrâouhâ * oué ghadet bezullin
oué îhhtiqâr

Oué foutouhh Mefrin kâna fy * Sfafarin oué
cûmr ûllah fsâr

Oué beyoum sebtin fyhi qad * ârkhet tamm âl-
êntefsâr.

M CC XIII*

* Without entering at large into the rules peculiar to Arabian poetry, I shall confine myself to two remarks which appear to be essential to our knowledge on this subject. First, The verse employed in this ode is composed of two hemistiches, each of which is called by the Arabs *mifra'a* (house-porch) or *chathr* (wall), and the union of the two forms the whole verse, called *beyt* (house). These verses are divided and seem in long and short feet nearly the same as in Greek or Latin poetry, but they have this essential difference, that all the latter hemistiches are terminated by the same ryhme, which continues throughout the piece.

Secondly, The last words of the last verse (which are un-declined) present a singular peculiarity; which is, that by their literal composition they give the date of the year of the Hegira, in which the conquest of Egypt was effected. The characters of the Arabic alphabet are often employed as numeral figures, and every letter of these two words has a numeral expression, the union of which forms the whole number 1213.

The Greek and Latin authors present similiar examples of chronological verses.

To understand this in a clearer manner I shall give separately the letters of the two words tamm el-entessar with their numeral expression *.

ta	-	-	-	-	-	400
mym	-	-	-	-	-	40
alif	-	-	-	-	-	1
lam alif	-	-	-	-	-	41
noun	-	-	-	-	-	50
ta	-	-	-	-	-	400
ffad	-	-	-	-	-	90
alif	-	-	-	-	-	1
fa	-	-	-	-	-	200
						<u>1213</u> †

* It may not be amiss to add, that as to numeral value the Arabic letters follow the order of the Samaritan, Hebrew, and Syriac alphabets; which seems to me to establish incontestably the prior antiquity of these alphabets, even over the ancient Arabic called *koufie*, whence is derived the *neskhy* (the modern Arabic), and which is itself derived from the strang-helo or ancient Syriac. (L-s.)

† The year 1213 began the 27th Prairial in the year 7 of the republic (Saturday, June 15, 1798, old style). The date of the events mentioned in this ode are too famous to make it necessary to lay them before the reader. (L-s.)

REPORT

*Of the Commissioners charged with the Examination
of a Monument near the
GREAT AQUEDUCT OF CAIRO,*

By Citizen DENON.

*Read in the Sitting of the Institute, on the
26th Vendemaire, Year 7.*

THE Institute, desirous of ascertaining whether the columns lying near the great aqueduct are the remains of an ancient edifice, nominated as commissioners for this purpose citizens Norry, Rigo, and myself.

We repaired to the place, accompanied by some labourers to remove the rubbish, so as to bring the whole of the ruins before our view.

Out of the whole number we found only four columns that were entire, four broken in two by their fall, one broken into three, and seven fragments of shafts of different diameters; the other parts of which could not be found.

We began by measuring the entire columns; of these the largest was eight metres seventy-nine

centimetres in length; one metre eight centimetres in diameter at the base; one metre in diameter at the top.

It was ill wrought, and chiselled and polished again in the defective places.

The length of the second was seven metres twenty centimetres, and the diameter of its base was eighty six centimetres; it was the most beautiful of the whole number, well chiselled and polished.

I shall spare the Institute the necessity of hearing dry details of measurement, which will only prove the accuracy of its commissioners, and which may be consulted at pleasure in the memoirs.

These columns, from their vicinity to the minaret of a ruined mosque, appear to have formed part of the building; this cannot, however, be ascertained on account of the saltpetre manufactory which is erected between the ruined colonade and the minaret; nor is the determination of this point a matter of the least consequence, it being evident, from the style of modern barbarism that prevails throughout, that the building itself was raised, after the conquest of Egypt by the Mamelukes, out of some rich remains of antiquity united together into a discordant whole.

OBSER-

OBSERVATIONS

On the Colour of the Sea,

By Citizen COSTAZ.

THE colour of the sea differs considerably when viewed from the shore, or from a ship at a distance from land ; in the former case it seems green, in the latter blue, the tint of which is subject to several variations. From sunrise to noon the colour of the sea varies gradually from indigo to ultra-marine, to Prussian blue, and at length to sky blue, according to the decreased obliquity of the rays of the sun : from noon to evening the same variations of shade take place, but in an inverse order. Any part of the sea that is in shade, however, even during mid-day, while the rest is of a sky blue, will preserve its deep indigo tint. A cloudy day also produces the same effect. Hence it appears that indigo blue is the natural colour of the sea, and all the other tints of blue are produced by the dilution of this with a greater or less proportion of the white light of the sun. In the same manner the green colour of the sea, when viewed from the

shore, is a mixture of its natural blue with the yellowish colour of the sand at the bottom.

If it be objected that sea water in a glass is perfectly colourless, I reply, that the colour is too dilute to be perceived, except in large masses; just in the same manner as common air, which is without the least tint in a vessel of colourless glass, yet is of a bright blue when viewed through the whole depth of the atmosphere. Indeed, this appears to be the case with all other transparent bodies that seem to us void of colours, the tint being too dilute to become visible, unless the bulk is very considerable.

PLAN

Of a School for Design.

*Read by Citizen DUTERTRE at the Sitting of the
Institute, 6th Vendemaire, year 7.*

I SHALL not enter into any particulars of the the general utility of the art of design, persuaded that you are all convinced of its importance as an essential part of a liberal education.

The application of this talent to our labours and researches will render our descriptions more striking by the illustration of figures: by this means we shall preserve those monuments which time has impaired, and which barbarism has disfigured or respected. We shall present to view the most interesting or picturesque situations; we shall represent with accuracy the utensils of agriculture, and machines and instruments of all kinds; we shall convey correct ideas of the external conformations of plants and animals, as well as their internal organization; we shall copy the finest forms of the most beautiful varieties of the human figure; and shall not neglect to trace out the deformities consequent of disease, for the benefit of those who employ themselves in the healing art.

I propose

I propose, therefore, to establish in the Institute a School of Design, under the following regulations:—

1st. That there shall be models made of the human figure for the use of beginners, in order to prepare them for the study of the living subject.

2nd. That the school where these shall be deposited be open every day for the use of the scholars.

3d. That the scholars shall have liberty to copy from a living model every day, from six in the evening to eight, during a decade.

4th. That there shall be no professor by name: all the artists being invited to supply instruction to those who may frequent the school.

5th. That such members of the Institute as are conversant in anatomy, shall be invited to give some demonstrations, with a view to assist the artist.

6th. That this plan shall be submitted to the examination of a committee, who shall ascertain the expence consequent on the establishment.

PLAN

Of an Agricultural Establishment in Egypt.

By Citizen NECTOUX.

Read before the Institute, 16th Vendemaire, year 7.

THE principal attention of an enlightened government ought ever to be turned towards agriculture: it excites industry, animates commerce, and becomes an inexhaustible source of glory and happiness to nations.

The importance of an agricultural establishment is so generally acknowledged, that we cannot delay the creation of one in a country, the physical organization of which confers on all kinds of productions the site, exposition, and degree of temperature proper for each. In short, Egypt gives the government just grounds for hoping that we shall be able to cultivate, with success, all the plants of acknowledged utility, whether indigenous or exotic.

The conformity of the climate with that of South America, during a large portion of the year, promises new sources of riches in the sugar-cane, indigo, and cotton; perhaps the coffee tree,

tree, and a number of other productions, no less interesting, may be also introduced. Among these ought to be distinguished, in a particular manner, the culture of cochineal, being of infinite consequence, at least so far as wealth is concerned. It is also attended with this advantage, that it requires but a slight preparation in order to render it marketable: it besides accommodates itself to lands of a middling quality; and those where but little rain falls are the most favourable.

The sugar-cane, indigo, and cotton, are, in fact, already reared in this country, but with so small a portion of success, or, more properly speaking, with so little skill and encouragement, that they may be fairly considered as a new branch.

But the direction of these establishments can be confided to those men alone, who, to a knowledge of warm climates, unite the practice and theory of colonial agriculture, and have, in some measure, guaranteed their success by a long series of voyages and experiments.

The great number of unsuccessful essays of this kind, more especially in our windward and leeward islands in the West Indies, ought to be attributed:

1^o. To an improper choice of position;

And 2^o. To inexperience in respect to that species of culture, which, by appertaining to hot countries, is entirely different from the mode followed in Europe; for it is not in this case intended to attempt the productions of France, or the northern nations, but precisely those in which they are deficient, which they are, in fact, incapable of attaining, but which have become absolutely necessary to the inhabitants.

To avoid all error, in respect to an appropriate site, it is necessary to wait until the country can be traversed in security, and its internal organization examined, so that every commodity may be reared in the place most analogous to its nature. The enormous losses attendant on bad success, will be thus prevented; but even then, establishments of this kind, ought only to be confided to men capable of administering to the new plantations that care which is so requisite at the commencement, either to accelerate their produce, or to multiply it by all the modes which it is in the power of art to employ.

By adopting such precautions as these, it would not only be easy to distribute a sufficient quantity of the different species of productions meant to be introduced among the inhabitants, but also

to

to form pupils capable of turning to advantage the treasure committed to their charge. It is thus, that, stimulating them by means of their proper interests, they might be snatched at the same time both from apathy and ignorance, under the yoke of which, despotism hath hitherto kept them bent.

At the aspect of these improvements, the Egyptian would behold the golden cane, whence the sugar is extracted, spring out of one part of his native country ; in another, they would contemplate the coffee tree loaded with its red and precious berries ; here they would see the young shoot of the indigo shrub ; there the silky cotton, so admirably adapted for garments ; in short, a multitude of other productions equally interesting.

The culture of these would instantly engage their attention ; and the hope of immense advantages would determine them to prefer such gains as are a little tardy, but much more considerable, to those which offer but a middling harvest.

The botanical cultivator would here unite the useful with the agreeable, and with the assistance of those labours, which would soon become familiar, he would be enabled to heap up treasures for commerce, dying, and the other arts.

The hospitals would derive daily assistance from the plants of the country, which would be collected in gardens consecrated to that purpose ; and we should have a new opportunity of determining whether each climate produces simples adapted to the cure of the maladies which prevail there.

There is no person who has not remarked in the course of his travels, that the peasantry are every where acquainted with a number of remedies extracted from vegetables ; and it is only to be lamented that their knowledge is usually confined to their own habitations.

The sole mode of uniting all the advantages which I have just pointed out, would be to inspect the country, and, after collection, to place all the plants in a national garden, where every inhabitant might obtain a complete knowledge of them. In respect to such as would require some experiments for perfecting the dyer's art, these might be cultivated on a great scale ; and it is notorious that this country presents amazing resources, so far as the lucrative trade of drugs and dye stuffs are concerned.

It is in national establishments that grand experiments should be made ; it is there that those precious commodities ought first to be brought to

to perfection, which formerly acquired for St. Domingo the appellation of *the French gold-mines*.

They are also to be found on the surface of the Egyptian lands. This territory presents a singular soil, in which the productions of all the four quarters of the world may be reared. There is not a single spot on the whole globe that presents equal advantages in respect to position.

In order to render such an establishment advantageous, it ought to be placed in a situation that has been selected with great discernment; it is necessary that the climate should be temperate, that is to say, placed as nearly between fifteen and twenty-four degrees as possible; the soil should be deep, of a good quality, sheltered from the prevailing winds, by either natural or artificial means, and refreshed with a current of water, or by means of hydraulic machines.

After having made choice of a proper spot, it ought to be advantageously laid out, and the necessary labours in respect to cultivation commenced; nothing should be neglected, not even botanical excursions, for the purpose of multiplying the different species; but I once more repeat it, that until a perfect knowledge of the country

country has been once obtained, nothing of this kind should be attempted.

It also appears to me highly proper, while forming establishments, whence are to issue the knowledge necessary for the perfection of a new species of agriculture, to make choice of a place large enough for the purpose of also erecting manufactories, for the various productions about to be reared. It is there, that the eye of an inspector, continually employed in observation, would be enabled to utilize and simplify the process of each, in order that he might communicate them in succession, by means of memoirs addressed to the cultivators.

It is requisite for the success of such an enterprise, that men acquainted with the nature of the different productions, such as the sugar-cane, indigo, coffee, and cotton, should be collected; they might be chosen from among the ancient colonists at present residing in France. It might not be difficult perhaps, to train up proper persons for the cultivation of the two last; but it is indispensably necessary to select experienced men for the two first.

I deem it proper to remove establishments such as these, to a considerable distance from the sea shores, as they are exposed to impetuous

winds, as well as to a saline atmosphere ; similar care ought to be taken, to avoid the neighbourhood of the sands of the desert. A spot might be found at a small distance from the banks of the Nile, which would add to many other advantages, that of not exposing such plants as are imported and exported, to the inconveniences attendant on land carriage ; these frequently occasion their loss.

One of the gardens ought to become a kind of receptacle for all the vegetable productions cultivated in the others : there also might be prepared those collections of living plants and seeds, destined for the museum of natural history. I am content with tracing a mere outline ; we must at present confine ourselves to general observations alone, having as yet examined Egypt only in a rapid and superficial manner : it appears to me, therefore, to be the sagest mode, to leave the minutia of every kind to another time, when they can be discussed in particular memoirs.

EXTRACT

*Of Observations by Citizen CERESOLE, Physician
in Ordinary to the Army, during a Journey
along the Western Banks of the Nile, from Cairo
to Siout.*

Head Quarters at Cairo, 30th Vendemaire,
7th Year of the French Republic.

THE complexion of the inhabitant of Sayd, (Sfaïd) is of a brownish hue, the features of the face are strongly marked, the eyes are black, small, deep in their sockets, the pupil contracted, the aspect fierce; the muscles which are prominent, project considerably at the extremities. The features of the women are more soft, and the center of the whole person more obtuse; but they do not possess either the lusture of beauty, or the grace of the European; an oblongated and flabby breast, added to a prominent belly, at an early period of life, mar the advantages resulting from their height; their eyes, however, must be allowed to be expressive, and their teeth are extremely white. In proportion as one advances towards

Siout (Syouth), he discovers in the form of the nose, the lips, the traces of connexion with the natives of the internal parts of Africa.

The temperaments of the inhabitants differ according to age and sex ; the children are in general disposed to phlegm, and consequently weak, while the adults, more especially the men, are sanguine and robust. The intellectual faculties correspond with the suppleness and activity of their organs. These are evidently modified, as well as the physical strength, by their more or less indolent mode of life, their habits, the neighbourhood of, or distance from the Nile, the air which they breathe in consequence of being shut up along with the cattle, in their stables, or accustomed to wander in full liberty throughout the country.

Here is to be found a sobriety, even in the bosom of abundance ; the people in easy circumstances have good bread, flesh, fish, eggs, and garden stuff on their tables : the poor eat broths composed of the meal of Indian corn, or of legumes. The term of life is pretty much the same among both classes, notwithstanding the difference of their manner of living : the men begin to lose their strength at about fifty years of age, and are very old at sixty ; allowing for a few exceptions,

the

the women in this part of the country, as elsewhere, fall sooner into decrepitude.

Menstruation and fecundity commence at from ten to twelve years of age, and terminate at from thirty-five to forty and forty-five. The boys when twelve or fourteen years old, begin to experience certain desires ; they even excite these by means of stimulants, and in the complaisance of the other sex, easily find the means of satisfying their cravings. It is perhaps on this account, that a certain vice which makes so many ravages among us, is but little known among them.

The water of the Nile, either clarified or filtrated, is their usual beverage ; but the Egyptians do not always drink when they feel an inclination ; they prefer taking mouth fulls of the liquid, without swallowing it, and pretend that this element, so useful when used in moderation, becomes hurtful when drunk to excess ; that it produces too great an abundance of sweat or of urine ; opens the belly ; and enfeebles the whole system. They delight in sherbets, liquorice water, pills made of hemp seed, and some articles of confectionary not equally relished by us.

The children of both sexes are commonly naked, from ten to twelve years of age, in the country adjacent to Minejeh, and Siout (Syouth) ;

and it is easy to be perceived, that the organs are then fully developed. A slight dress of wool or cotton afterwards cover their dark and hardened skin; in other respects they preserve the fashions of Lower Egypt, in their vestments and turbans.

The men live on the same floor along with the domestic animals, and sleep sometimes on mats, with their clothes upon them.

The first and only story, or, by way of expressing myself more clearly, the whole of the upper part of their habitations, is consecrated to pigeons and turtle doves, which abound in the Sayd (Sfa'id).

In the towns there are some well built houses; rich people possess their harems, and enjoy the other luxuries of life; the markets abound with shops, which are dark and narrow. On casting an eye on the instruments and labours of the artizans, they are discovered to be rude and imperfect, although they themselves are far from being destitute of address.

The children, whose parents are in pretty easy circumstances, learn to read; the Copt merchants (*Quobthes*) are acquainted with the first rules of arithmetic; and to these limited attainments may be attributed all their influence.

There are beggars, who run about the streets accom-

accompanied by musicians; and also many Santons, for whom the people are inspired with great veneration.

The peasants, far more respectable, and infinitely more useful than the contemplative mystics, sow, till, and refresh the sandy plains with the waters of the Nile. The vegetation, which is at once rapid and delightful, has a great analogy to the animals which it sustains.

The vices of polished nations are prevalent throughout the Sayd (Sfa'ïd), and they are carried to such a pitch, as to produce those evils ever attendant on ignorance and slavery.

At the gates of Siout (Syouth) there are a number of disorderly women, who stop the passengers; and they are acquainted in that place with the shameful species of prostitution, which counteracts the end of nature, and her admirable laws for the reproduction of beings.

Notwithstanding their resignation to destiny, which makes them consider maladies as an inevitable chastisement, the old men, and particularly the old women, distribute amulets and talismans for all ills, but more especially as a preventive against magic and magicians, who, according to their way of thinking, occasion all the evils incident to the universe.

The knowledge of medicine, if we may confer that name on a rude and ridiculous empiricism, consists in a series of loose observations, entirely unconnected with each other. The sick are exposed in the streets, or at the doors of the mosques ; it is there, more especially, that they exhibit the disgusting and afflicting spectacle of such diseases as attack the absorbent system of the skin, and constitute that numerous class on which nosologists have conferred the appellation of cachexy. Whether the maladies be old and inveterate, or violent and recent, they manifest nearly the same indifference in respect to their termination.

Notwithstanding this, the inhabitants of the Sayd (Sfa'id) are inspired with great confidence in regard to foreign physicians, and they readily communicate their situation to them. They accordingly have learned to give decoctions of herbs to their children, on purpose to destroy worms ; and a drink, composed of linseed oil, for the purpose of calming convulsions ; they have found out also that the nurses (and this is an interesting fact) often drink the medicaments destined for their infants ; that consumptions frequently succeed obstructions of the belly ; and that the small-

small-pox is dangerous, often producing weakness in the eyes, and sometimes blindness.

Their treatment of this last malady is directly opposite to what experience teaches us to consider salutary : the sick are shut up in close apartments, carefully wrapped up, and subject to a hot regimen. May the inhabitants of these countries learn, some day, to adopt the more natural method which hath so much softened that once-redoubtable scourge throughout Europe !

The children are seldom distorted : this circumstance, perhaps, proceeds from the liberty they experience, as their limbs are never compressed by any kind of bandages whatever.

At Minyeh I was consulted about a girl of fifteen years of age, who was afflicted with the chlorosis. Her mother, and some other old women, had endeavoured in vain to restore her, by means of mechanical irritation, a few drugs and many amulets. I advised the use of chalybeate ; but the repugnance testified by them, in respect to such medicines as proceed from the mineral kingdom, prevented the family from recurring to this mode of cure.

An old empiric of Siout (Syouth) accompanied me almost constantly, with a view of assisting in my enquiries. He had but one eye, was a great

a great boaster, and was accustomed to vaunt that he possessed marvellous secrets, by means of which he could cure all kinds of maladies. These he pretended to have either extracted from the Koran, where assuredly they are not to be found; or to have become acquainted with, in consequence of the inspirations of the Prophet, with whom his connection was equally problematical:

Child-bearing is here accompanied with an inclination to vomit, and other desires, some of which are very fantastical. The women frequently miscarry in summer. They suffer more at the birth of their last than their first child, and would rather die than allow themselves to be assisted by a man-midwife.

If young women are not with child within a little time after their marriage, they solicit the assistance of the more aged, who anoint such of the internal parts of the sexual organs as can be easily reached, with liniments; they also give them powders, the nature of which we are no more acquainted with than the virtues of those enchantments which they use at the same time! Sterility is branded with infamy by the law of Mahomet!

In hysterical affections to which the females are subject, they either make them smell the dung

dung of the camel, or apply it in form of a cataplasma, along with four milk, to the temples, the stomach, and the lower part of the belly. The women are frequently subject to diseases of the vagina and the rectum.

During internal maladies, the inhabitants of Sayd (Sfa'ïd), generally give themselves up to repose and a vegetable diet, which they scrupulously observe. They are acquainted with the purgative faculty of aloes, cassia, and tamarinds; but they do not know when to administer these medicaments with propriety. Some of them eat slices of quince powdered with pepper, to stop a diarrhoea; others drink lemon-juice. Cachexy is reputed incurable. Cancers are covered with powdered chalk; they also apply animals just killed and opened, to the head, the side, and other parts of the body, in recent pains: frictions, as also hot and cold baths, are in great vogue.

In maladies of the eyes, the head is frequently shaved, and afterwards rubbed with vinegar; some colour the eye-lashes, and apply a black plaster to the eye-lids. They also scarify the angles of the eyes, and throw certain powders on that delicate organ itself; but water, either by itself, or when employed as the vehicle of any medi-

medicament, is rejected; all liquid topical applications are considered to be dangerous.

They often practise bleeding with a fleam, similar to that employed by our farriers: they adapt, to the surface of the skin, the base of a cone formed by the horn of a young bull, which has been pierced at the top. By means of suction, they attain the same effect as that produced by a cupping-glass, and are thus enabled more easily to scarify the parts.

Milk and honey are employed in diseases of the breast; tobacco and coffee are considered as aperients, which facilitate digestion.

I have seen a great number of hernias, of all manner of forms and sizes, without any pains whatever being taken either to confine or support them. At Siout (Syouth), I administered a vomit to a young man; during the operation, all his family were greatly alarmed; he was indeed believed to be poisoned, but the ease that ensued at length reconciled them to this remedy. When a wound has been occasioned by fire-arms, oil or melted butter is applied; they afterwards use some portions of flesh belonging to an animal newly killed, which they carefully renew; they then cover the whole with the skin of the same, and leave the patient to nature and repose.

They

They endeavour to reduce dislocations, by employing very violent distention. They abandon venereal maladies, leprosy, and the elephantiasis, to themselves.

I was unable to attain so much information relative to the plague as I could have wished. I am induced to conclude, however, after much enquiry, that the term *plague*, or *koubeh*, in Arabic, is a generical denomination applied to all very violent and malignant diseases. They assert in the Sayd (Sfa'ïd), that this malady has been always brought thither from Lower Egypt.

The resignation of the mussulmen to their destiny, prevents them from guarding against that horrible scourge. The dogmas of the ancient Egyptians, who considered life merely as a passage to a long, future existence, a sleep that leads to an eternal waking, seem to be also preserved among their descendants; and one is almost convinced of the truth of it, when on comparing the houses and the tombs together, he always beholds the dead better lodged than the living.

AN ATTEMPT

To translate a Fragment of the Koran into Verse,

By Citizen MARCEL.

THE Quoran, Koram, or *Eminent Book*, is considered by the Mussulmen as a masterpiece of eloquence : the Arabs indeed pretend, that there is not a better written production in their whole language ; and it is certain that the son of Abdallah was less indebted to the swords of his partisans for the greater part of his astonishing success, than to the hundred and fourteen *sourat*, or chapters, which he caused to descend in succession from heaven, on purpose, as occasion served, to electrify the rude minds of his countrymen.

The Koran, like the Bible and the Vedas, contains the principles of a pure morality, intermixed with a variety of ridiculous fictions, which philosophy would not be able to contemplate without pity, did she not consider at the same time, that it was precisely this very combination of truths and reveries that ensured the triumphs of the *Apostle of God*, whose policy, enlightened by the

the study of the human heart, and the knowledge of the character of his contemporaries, easily perceived that it was necessary to employ the obscure and unintelligible language of prophecy to those who were deaf to his voice, when preaching truths far too simple for them, he exclaimed*: "Adore the Supreme Architect of the Universe alone! This God is one, indivisible, without equal, without associate ; he neither engenders, nor is engendered ; men of all religions are acceptable in his eyes, provided they be just and benevolent."

The stile of the Koran is different, according to the different objects of which it treats. When the happiness destined for the faithful is to be depicted, it exhibits a richness of imagery, and a magnificence of expression that dazzles by its variety ; and when it addresses himself to the enemies of *Islamism*, it resembles a fire that scorches, or thunder, that lays every obstacle in the dust.

* Sourat 2, 64, and 112. *Nota.* This word signifies the steps of a stair, &c. The chapters of the Koran are the steps by which one ascends to the work itself. The verses are called *ayat*, marvel, or miracle. Each verse of the Koran appears to a Mussulman to be a miraculous production of divine power. (L—s.)

In addition to this, he takes advantage of the genius of his language; his phraseology may, perhaps, seem to us to be somewhat distorted, and wholly destitute of transitions: it is also replete with metaphors which we are apt to consider as unrestrained and hyperbolical, but which appear to the Arabs to be grand and lofty.

But he is truly sublime when he speaks of the Divinity, and invokes or addresses prayers to him, which are always expressed in a dignified manner, wholly destitute of mystical affectation.

As an example of this, may be cited the first *Sourat*, called *Sourat el-fatihhat*, or introductory chapter, for which the Mussulmen entertain so singular an esteem, that they repeat it several times a day.

I regret that I am not able to transfuse into a translation those beauties that sparkle in the original; beauties so manifest, that when the celebrated *Lebēid* happened to read at a gate of the mosque where a number of the Arabian poets had assembled, some fragments of the Koran which Mahomet (Mohammed) had caused to be attached to it, he instantly withdrew the poem he himself had carried thither, declaring that no writer ought to attempt to rival the author of the passages he had then perused.

TRANSLATION.

TRANSLATION.

In the name of the Being, supreme in power as in essence ; in the name of a gracious Deity ; a God replete with benevolence, who every day loads us with his gifts ; toward whom we elevate our eyes, and offer up incense !

All praise be ascribed to the God of heaven, of earth, and of the ocean ; the Father of the universe !—Ruler of worlds !—Arbiter of the destinies of mankind at the day of judgment !—Avenger of the oppressed—Supporter of the innocent !

It is towards thee that our hearts offer up their prayers ; it is thee whom we implore as a common father ! hearken to thy children ! may equity always follow their steps, and be their assured guide ! O may they fly from the delusive paths of error ! may no crime on their part call down thy wrath ! and directing constantly towards thee their hearts and minds ; may they always prove themselves thy real adorers !

TRANSCRIPTION AND TRANSLATION

Of the first Sourate of the Koran,

By Citizen L——s.

Sourat fatihhat al-ketab el-a'zyz, oué hye seb'a ayat,
Mekkyet.

BISM illahi er-rahmani er-rahhymi
El-hhamdou lillahi rabbi el a'alemyne.
Er-rahmani er-rahhymi.
Maleki yeoumi ed-dyni.
Eyyaka na'bodou oue eyyaka neste inou
Ehdena el-ssiratha el mousfeqyme
Sfiratha el-ledsyne an'amte a'leihim.
Ghairoul-magdoubi a'leihim oue la edh-dhalyne.

TRANSLATION.

The Sourate which begins the august book, contains seven verses, and was written at Mecca.

In the name of God, benign and merciful !
All praise be to God, the governor of worlds ;
merciful and benign ; sovereign director of the
day of judgment.

We

We adore thee, and implore thy succour!— Direct us in the straight path; in the way of those who experience thy benefits; who have never provoked thy wrath; and never wandered from thy worship!

According to the commentaries on the margin of the edition of the Koran, published entirely in Arabic, at St. Petersburgh, in 1789, in one volume, folio, for such of the Mussulmen as are subjects of Russia, “the theologians (eu’lema) are not agreed as to the place where this *Sourate* descended from heaven: Some of them maintain that it was at Mecca; others, at Medina. The following are two of the names given to it; *the mother of the Koran and the seven repetitions*, because it contains seven verses, which the Mussulmen have continually in their mouths.” The author of the commentary just quoted by me, remarks “that this Sourate contains 20 words, and 123 letters.” It is well known that the Mussulmen have had the patience to perform the same task for the whole Koran. See *Reland, De Relig. Moham.* p. 25. (L—s).

*On the Dying of Cotton and Flax, by Means of
the Carthamus.*

THE Carthamus is the flower of a plant scarcely ever cultivated any where except in Egypt; but which is an important object in the commerce of that country. It is employed in Europe for dying silks of a poppy, a cherry, and an orange colour: the rouge which confers on women the colour of the rose, is composed of the tint of the carthamus, mingled with talc powdered very fine.

The dyers in Europe but seldom make use of it for cotton, not being able to obtain a sufficiently rich colour by that means: perceiving, however, that it is here employed with success, by those of the same profession, I repaired to one of their shops, in company with the citizens Descotils and Champy, jun. and caused a piece of muslin and another of linen to be dyed in our presence.

The dyer made use of well-water, that is to say, of water containing a little alkali, to cleanse the carthamus from the yellow substance which it is first necessary to separate from that which is
the

the red colouring matter; after macerating and leaving it for twenty-four hours, he expressed the carthamus, and transferred it to a second water, where it remained during twenty-four hours more, when the same operation was repeated.

In this state the carthamus was mixed with a fifth of its own weight of certain ashes, which contain but a small portion of soda, and then placed beneath the stone of a common mill. After several turns of the mill-stone, it was collected with a view of being employed. The dyer then caused a small quantity of the water of the Nile to be applied, so that the liquid thus filtered through it became tinted with the colouring substance; this being done, he separated the last portion filtered, and employed it the first, mixing a little citron juice with it at the same time. The cotton being now impregnated with a faint colour, the first liquid was mingled with a considerable quantity of citron juice, in a caldron placed over a furnace, and the dying was completed in a warm bath of between forty and fifty degrees: the cotton soon after assumed a highly saturated and beautiful colour. On leaving the copper, it was passed through water acidulated by means of citron juice, and finally dried.

The linen was treated in the same manner; it was, indeed, less saturated with the colour, but the tint was still beautiful.

The difference between this process and that practised in Europe, consists in this:

1°. That water, in a small degree alkaline, is made use of, on purpose to extract the yellow colour.

2°. That the alkaline is incorporated with the carthamus by means of a mill-stone, instead of a simple admixture, which probably causes it to yield a greater quantity of the colour when dissolved in water. And

3°. That the bath is here a little heated, while this operation is performed in Europe with cold water.

The cotton dyed by means of the carthamus, does not stand the application of soap, because its colouring matter is soluble in alkalies; in that case it assumes a violet tint: it however will endure a slight application of soap, provided it be thrown immediately after into water acidulated by the juice of citron; it will not, even then, it is true, re-assume its original colour, but present an agreeable lilac shade.

The lustre of the carthamus does not long endure the action of the sun, yet it becomes weaker without changing its hue; and all its former vigour

vigour may be restored by means of a second dying. But, in order to succeed in that operation, it will be necessary to begin by putting the stuff in a bath composed of an alkaline water of carthamus, and not add the citron juice, until it has been impregnated with the colouring substance.

MEMOIR

Relative to the Lake Menzaleh, in consequence of the Knowledge obtained, in Vendemaire, 7th Year.

By ANDREOSSY, General of Artillery.

EGYPT has been the cradle of the arts and sciences. Their principles were either collected by the colleges of priests, or confided to those hieroglyphics, the language of which is no longer known. The Egyptian priests, occupied in an especial manner with observing the heavenly bodies, paid but little attention to the natural facts that occurred before their own eyes: thus when Herodotus was at Memphis, he perceived, while conversing with the priests, that they were unacquainted with the causes of those changes that had occurred in the lower parts of their country, comprehending that space between the entrance of the plain and the sea.

It is a remarkable circumstance, that at the epoch when this father of history travelled through Egypt, it had but just emerged from a long war, during which every thing appertaining to public economy was neglected; the canals had

had consequently experienced its disastrous effects. In addition to this, the inhabitants still groaned beneath a military government similar to that of the Mamelukes, and the lands in the neighbourhood of the desert were then, as now, infested by robbers.

Herodotus accordingly found Egypt in nearly the same state as it has been ever since, and consequently was not able either to ascertain or collect a great number of facts; those contained in his *Euterpe* are precious, but he leaves us in an uncertainty respecting a great many others. Strabo and Diodorus Siculus, have added but little to the narrative of Herodotus. Aboulfedha, by making us acquainted with the geography of his time, and the other writers of the thirteenth century, by means of their conjectures, have only served to augment our doubts. Besides this, Egypt so often subjugated, on changing its masters, must necessarily have changed its language also, and the different denominations of objects; that had either undergone modifications, or were no longer in existence, tended only to produce confusion in respect to ideas.

The authors of our own times have only been able to lay the ancient writers, and modern travellers, under contribution. In consequence of the

their researches, and more especially those of Danville, several learned dissertations have ensued, in conformity to which, that celebrated geographer hath constructed the only maps of ancient and modern Egypt on which we can rely.

It has already been perceived, however, in consequence of actual experiment, that the chart of modern Egypt abounds with many errors; and it would have been extremely difficult, notwithstanding the profound criticism employed by Danville, to have avoided them. The residence of the army, in these countries, will furnish an opportunity of rectifying the greater part of these mistakes; of obviating many doubts; of re-establishing a multitude of facts, almost forgotten in consequence of the lapse of time, and the barbarity of the different governments, which have hitherto precluded research.

The General in Chief having ordered me to recognize the lake of Menzaleh, the instructions transmitted, and the intelligence procured by him, enabled me to give more extent and precision to my operations, than military men, in similar cases, are able to exhibit. I shall now give an account of my labours; I shall state my conjectures; and I shall support them by recent enquiries.

quiries. In calling to my assistance a few geological facts, which I quote on the authority of the early writers, I am not to be considered as adopting them exclusively ; on the contrary, I shall consult nature, which existed before these authors, and which is at the same time our own contemporary.

SECT. I.

Of the Ancient Tanitic Branch, that has been re-discovered.

IT was the opinion of the ancients, that the Nile emptied itself into the sea, by means of seven mouths. It therefore had seven branches,* which receiving the waters on their leaving the mountains, conducted them to these seven openings.

* The poets have called these seven branches, the Mouths of the Nile (*ora*) ; this denomination originated in the idea of grandeur which they wished to annex to this river. But, in treating of the geology of Egypt, we are forced to establish a distinction ; we shall, therefore, denominate the canals, reaching from above Memphis to the Mediterranean, *branches* ; and the openings of these branches into the sea, *mouths*. This distinction is the more necessary, as some of the primitive branches are suppressed, either in whole or in part, while their mouths are found entirely insulated, or forming communications between the different lakes of Egypt, and the sea.

The

The order in which they knew them, was in the direction of from east to west.

- 1°. The Pelusiac, or Bubaestic branch.
- 2°. The Tanitic, or Saitic, which at present bears the name of Omm-Faredje.
- 3°. The Mendesian, or branch of Dybeh.
- 4°. The Phatnitic, or Bucolic branch, which is that of Damietta.

5°. The Sebennitic, or branch of Burlos.

6°. The Bolbitine, or branch of Rosetta. And

7°. The Canopic, or branch of Abou-gyr.

Do these branches exist in whole or in part? And can the traces of them be discovered? This is what we are now about to examine, in respect to the first, which are included in the enquiry made by us.

The Pelusiac branch was navigable, when Alexander penetrated into Egypt; it was through it that he caused the fleet to ascend, which he had brought from Ghazah: at present, however, this branch is filled up: the extremity, which is in the neighbourhood of the sea, before Pelusium, is full of mud. The remains of it may be rediscovered in the province of Charqyeh, by searching towards Bastah, a ruined town, anciently known by the name of Bubaustum, and which is perceived

perceived at some distance to the left of Belbeis, and on the road towards Syria.

An impenetrable obscurity prevails relative to the Tanitic and Mendesian branches, which come after the Pelufiac, and once occupied the spot where lake Menzaleh now is; it was formerly known by the name of lake Tenny.

When I had penetrated to the lake Menzaleh, by the mouth of Dybeh, on the 12th Vendemaire, I was struck with the breadth and depth of the canal which lies to the right after you have passed the mouth. I began to think that this might be the extremity of the ancient Mendesian branch, and I endeavoured to discover the direction, by frequently taking the soundings: the circumstances accompanying my entrance, did not permit me, however, to accomplish that task.

But what I was not able to execute for the Mendesian, I think I have performed for the Tanitic branch, the mouth of which is Omm-Faredje. On repairing from that mouth to Samnah, you first pass to the right of the isles of Tounah and Tenny, and then penetrate into the canal of Moez. The entrance is deep, and the bottom is composed of black mud. The anchorage

to

to the right of the isles just mentioned, is from sixteen to twenty decimetres. The left hand side is only practicable for small craft, and the utmost limits of the navigation of the lake do not extend far beyond the line of their direction. The islets, and flats, connected with the southern parts of these isles, give reason to suppose that a large portion of land has been here submerged.

The canal of Moez, which overflows the province of Charqyeh, penetrates into the lake Menzaleh, towards the south-west of the isles of Matharyeh. This canal, from Samnah as far as the lake, is from fifty to one hundred and twenty metres in breadth, and about three or four metres deep. It communicates with the Nile, and, during the time of the inundation, pours a large volume of water into the lake; this penetrates to a considerable distance without becoming salt. The banks of that canal are flat, a circumstance which denotes that they were not constructed in modern times, as we shall see in Section V.

All these indications proved more than sufficient to induce me to suspect that the canal of Moez is merely a portion of the Tanitic branch, which is prolonged to the mouth of Omm-Faredje, and which has the towns of Samah, Toumah, and Tennys, on its right bank. I was confirmed

firmed in this idea, when I began on my return to construct a chart of the lake, in conformity to the notes taken by me on this occasion: for the direction of the canal of Moez, as well as that of the isles of Tounah and Tennys and the mouth of Omm-Faredje, arranged themselves in the same line, allowing merely for that natural curvature which water ever affects.

The traces of the Mendesian branch, the mouth of which is Dybeh, may be discovered by repairing towards the canal of Achmoum, or what would be still better, towards that of Fareskour.

SECT. II.

Present State of the Lake Menzaleh.

THE lake Menzaleh is comprised between a couple of large gulfs, each of which is cut into two smaller ones, and a low and narrow tongue of land, that separates it from the sea. These gulfs re-unite and form the peninsula of Menzaleh, at the extremity of which lie the isles of Matharyeh, the only inhabited ones in the whole lake. The greatest extent of this collection of water, in the direction of west-north-west, is 8,385 metres [43,000 fathoms]; it extends from

Damietta,

Damietta, to Peleusium : its smallest dimension, in a perpendicular line to the former, between Matharyeh and the mouth of Dybeh, is 23,400 metres, (12,000 fathoms).

The isles of Matharyeh are very populous. The huts belonging to the inhabitants, are built either wholly of mud, or of mud and brick, and entirely cover their surface. In the isle of Myt-el-Matharyeh, these cabins are huddled together along with the tombs, and appear rather to be so many receptacles of wild beasts, than habitations for men. The population of this spot, exclusive of the women and children, amounts to 1100 men, who are occupied in catching fish and fowl.

They live under the command of forty chiefs ; these in their turn depended on Hhaçan-Toubar, who hired the fishery of the lake of Menzaleh from the Beys ; in addition to this he was one of the richest men in all Egypt, and perhaps the only one who dared to accumulate so much landed property. His family came originally from Menzaleh ; it reckoned from four to five generations of Cheykhs. The authority of Hhaçan-Toubar was very considerable ; it proceeded from his credit, his riches, his numerous kindred, the great quantity of people employed by him, the and support of the Bedouins, to whom he

he gave lands to cultivate, and whose chiefs he loaded with presents. These different tribes of Arabs could enter the canal of Mo'es by that of Sfalehhyyeh, which communicates with it, and thus reach to the lake, in order to join the inhabitants of Menzaleh and Matharyeh.

The latter, having neighbours such as these, and being the only proprietors of from five to six hundred vessels which navigate the lake, became the tyrants both of it, and the country immediately adjacent. Their commerce consists in fresh and salted fish. The roe of the mullet also furnishes *poutargues*, and during the time they are employed in catching it, from forty to fifty families live in little cabins, composed of mats, near the mouth of Dybeh, opposite to the extremity of the islands.

The fishermen of lake Menzaleh and the Bedouins of the villages are alike covetous and ignorant. They are not acquainted with the division of time into hours, nor like the Arabs of the desert, can they tell the period of the day. The rising, the setting of the sun, and noon, are the only portions of the twenty-four hours which they distinguish, and it is merely by supposing themselves at home, and by connecting the portions of the day just alluded to, with

the idea of distances, that one is enabled to acquire any idea relative to the position of their respective cantons.

Menzaleh, which has given its name to the lake, is an inconsiderable town, in part ruined, situated on the right bank of the canal of Achmoum, at three leagues distance from Matharyeh, and six from Damietta ; its population consists of nearly 2000 inhabitants ; it possesses some manufactures of silk stuffs and sail-cloth, with which it supplies Matharyeh ; it also has a few dyers, and carries on some other trifling branches of trade.

In lake Menza leh there are some isles formerly inhabited, but now covered with ruins ; they rise considerably above the level of the surrounding waters which induces their inhabitants to give them the appellation of mountains*. We shall make it appear hereafter, that these isles were formerly towns, which had belonged to a large tract of land, since ruined by the waves.

The isles of Tennys and Tounah appear to be the most considerable. The former has preserved its ancient name, while Tounah has adopted that of Cheykh-A'bdallah, from Cheykh or Santon, to whom a tomb had been erected

* They say : the mountain of Tennys, the mountain of Tounah, the mountain of Samnah,

here. According to the observations of Volney, the various denominations of *Cheykh*, *Santon*, *fool* and *ideot* are synonymous. The Santons, who during their lives attract the astonishment of the nations of Asia by the gloomy extravagance of their actions, after their death have tombs erected to their honour, which are greatly revered; these excite the zeal of the faithful, whose piety prevails on them to depose some alms there for the poor. Have not our own chapels and oratories spread over the country, or scattered along the highways, with their begging boxes, their solitary lamps, and the images traced on their walls by the pencil of superstition, the self-same object.

The isles of Lake Menzaleh, which are nearly on a level with the water, are uncultivated, barren, and devoid of any other productions except marine plants. Some of them possess the tombs of certain Santons, which, on this uniform surface, are the only remarkable points of direction we could find for the construction of our chart.

The taste of the waters of Menzaleh is less disagreeable than that of the sea. They may be drunk during the inundation of the Nile, at a pretty considerable distance from the mouth of the canals which discharge themselves, like that

of Mo'ez, into the lake. They are brackish and unpalatable in those parts where there is a communication with the rice fields.

The waters of the lake are phosphoric, and the air is very healthy; it is more than thirty years since the inhabitants of Matharyeh experienced the plague.

The general depth amounts to a metre; from two to six metres may be found in the direction of the ancient Tanitic and Mendesian branches. The bottom of the lake consists of clay mingled with sand, at the mouths; of black mud in the canals of Dybeh or Omm-Faredje; of slime, or slime and cockle-shells every where else: in many parts it is covered with moss.

The Menzaleh abounds in fish; the entrance of the mouth is frequented by porpoises. We saw but few birds, but there are many in such of the marshes along the sea, as had been abandoned by the waters.

The lake is navigated by means of sails, oars, and poles; a contrary wind, provided it be strong, renders the passage twice or thrice as long as it would otherwise be. They anchor by means of two poles, which they easily stick in the mud, one at each end of the vessel. The fishing boats are nearly of the same form as those of the Nile; that

that is to say, the prow is about seven decimetres more elevated than the poop. In the former, the stern also dips more into the water; this affords a greater degree of facility to the fisherman, who stands on the deck, on purpose to hand, to throw, and to draw up his net.

When the inhabitants of Matharyeh intend to fish at a distance from their own isles, they take on board a quantity of fresh water in large jars, which are tied to the foot of the masts of their germes; each germe carries one.

The fishermen of Matharyeh appear to form a separate class. As they prohibit their neighbours from enjoying the advantages of the lake, they have but little communication with them. Nearly always naked, generally employed on the water, and occupied continually in a laborious calling, they are strong, vigorous, and determined. They possess fine figures, but their aspect is savage; their skin is burnt with the sun, and their beard, which is both black and harsh, renders their appearance still more hideous. In presence of their enemies, they utter a thousand barbarous cries, accompanied with a most furious howl; they at the same time strike a kind of tambourin, the decks of their boats, or any thing that will occasion a noise; they apply the buc-

cina to their mouths, and make its conct utter the famous *rouhh* ;* “ if we were militia,” exclaimed our volunteers, “ this noise would affright us, and we should jump into the water.” It is thus that the French soldier on every occasion preserves his gaiety, and by means of some merry saying, either prevents the tedium of life, or banishes every idea of danger.

The lake of Menzaleh only communicates with the sea by means of two practicable mouths, those of Dybeh and Omm-Faredje, which are the Mendesian and Tanitic openings of the ancients.

Between these there exists a third, which would also communicate with the sea, were it not for a factitious mound, formed of two ranks of stakes, the interval between which is filled with marine plants. A similiar mouth, only that it was closed up, lies beyond that of Omm-Faredje. These openings were known to the ancients, and Strabo designates them by the name of *ψευδοστοματα*, (pseudostomata,) false mouths.

The tongue of land, which separates the sea from the lake, and extends from the Phanitic

* *Rouhh a'nn yakeleb !* that is, retire from me, thou dog !
mouth

mouth, or that of Damietta, to the Pelusiac mouth, has only four interruptions in an extent of about 86000 metres. This tongue, which is pretty broad between Damietta and Dybeh, and between Omm-Faredje and Pelusium, is narrow between Dubeh and Omm-Faredje ; it lies very low, remains uncultivated, and, like the sides of the lake, is covered in some places with marine plants. The shore does not abound in shells, flints, &c. there are only a few pumice-stones, which the sea carries thither. The most common kinds of shells are the buccinæ, and bivalves of the smallest kinds.

Each mouth is shut up towards the sea by a bar or bank, forming a portion of a circle, the extremities of which join the shore. These bars differ, in respect to the surf, from that at the mouth of the Nile near Damietta ; but they exhibit the same figure and position, in respect to every thing else. As the wind elevates the waters of one of the channels nearly six decimetres, and sometimes more, the banks may be easily passed by vessels of small burden.

In order to produce a surf on these bars, a considerable current at the opening would be necessary ; that which prevails in a small degree there,

is occasioned by a sort of balance between the waters of the lake and the waves of the sea, during and after the solstice, as we shall see hereafter.

At the time of the summer solstice, the north-west wind drives the waters of the sea on part of the coast of Egypt, detains them there, and causes those of the Menzaleh to flow back on its shores, and cover the low islands scattered over its bosom ; the lake itself receives the inundation, which enters it from the surrounding canals. This vast basin, at that period, resembles an immense plain ; but when the north-west wind ceases to blow, the waters of the Mediterranean falling back, in consequence of their own gravity, leave a shore of about two hundred metres wholly uncovered ; the flood occasioned by the Nile begins to diminish ; the waters of the lake retire from that part of the isles which they had covered, in proportion as the inundation abandons the soil of Egypt, and forms a current at the mouth of Dybeh and Omm-Faredje, the celerity of which is tantamount to about 3000 metres an hour, which, at the end of a certain period, will of course occasion a sensible diminution of the lake.

Egypt

Egypt then ought to be considered in two points of view ; the first at the epoch when the waters cover the country, the second when they have entirely run off.

SECT. III.

Present State of the Lands in the Neighbourhood of Lake Menzaleh.

THE territory adjoining the Menzaleh is partly barren and partly cultivated. From the mouth of the Nile to the Pelusiac opening the tongues of land, reaching along the sea-coast, are sterile ; the plain of Pelusium, and the borders of the lake, as you ascend towards the province of Charqyeh, constitute a desert. That province is overflowed by the canal of Mo'ez ; the same canal, and that of Achmoum, inundate a part of the district of Menzaleh. The canton of Fareskour receives the waters of the canal of the same name ; the peninsulas of Damietta and Menzaleh are covered with beautiful rice grounds, supplied by channels destined for irrigation, the surplus of which is drained by means of cuts made expressly for that purpose.

The communication between the canals of Euseb-

Euseb-el-Kache (Qaffab-el-Qach) and Douhaz-Selamch, at a league above Damietta, has impressed me with a proper notion of the system of irrigation pursued in these parts, and also the means of guessing, without taking the level, of the difference of height between the waters of the Nile and those of the lake.

The first canal derives its waters from the Nile, and directs its course towards the Menzaleh, without having any communication with it; it is shut up by means of banks of earth, and furnishes proper channels for watering.

The second communicates with the lake alone; it is lower than the canal of Euseb-el-Kache, (Qaffab-el-Qach) near to which it is placed, and is only separated from it by a narrow mound; this is destined to receive the waste waters from the rice grounds.

On comparing the height of the waters of these two canals at the upper part of the dyke which separates them, on the 15th Vendemaire, the difference between the depth of the first and that of the second, amounted to thirty-five centimetres, which contained an estimate, for that day, of the elevation of the Nile above the correspondent part of the Menzaleh; for the comparison between these two heights must vary according to

the

the reciprocal fall of the waters of the Nile and those of the lake. Below Menzaleh there are two canals, which are collected in a similar manner; and others of the same kind must exist in the gulph of Fareskour. A nilomen-zalometre placed at each of these points would afford a daily statement of the variations.

The land destined for the rice grounds is divided into compartments, surrounded by little mounds, with sluices to open and shut at pleasure, in order to receive or discharge the waters.

The fields in which the grain is sown, and the squares for producing marine salt by means of evaporation, are disposed in the same manner. In the latter process the water is only subjected to a first evaporation, by its residence in a separate reservoir; when it is once concentrated, it is introduced into the compartments, where it is spread thin on the surface. The sea water is conducted into a reservoir a little lower.

When they intend to sow, they begin by preparing the ground; they then water it, and, at the end of twenty-four hours, when the earth becomes sufficiently moist, several men make their appearance, rake up the soil with their hands, reduce the inequalities, and cast away such of the clods as are too hard. This operation being

ing performed, they let off the water ; soon after this they sow the seed, and, at the end of a few days, the country is covered with verdure. - We observed that the waste ground on the borders of the canals destined for the purpose of irrigation, is employed in the same manner as dung ; it is placed in heaps in the fields, before the furrows are traced, exactly according to the mode followed in Europe.

When a fall of water cannot be obtained, that element is introduced by means of a wheel, either with buckets appended, or furnished with hollow felloes : these last are used in preference, when the level of the alimentary canal is not too low.

Such is the manner of cultivating the lands in the neighbourhood of Damietta and Menzaleh. The latter of these possesses two salt marshes, adjoining to the lake, in that part comprised between the two branches into which the canal of Achmoum divides itself below the town ; these supply a large quantity of salt, which is obtained by the process alluded to above ; it is extremely white, and is chrystallized in layers of from six to eight millimetres in thickness.

One of the branches of the canal of Achmoum takes a direction towards Al-Sfafrah : its water serves to supply the rice grounds, and also to furnish

nish the people of the isles of Matharyeh, and those of the neighbouring villages, with drink, during the inundation. The inhabitants take advantage of this favourable moment to fill the public cisterns, which are large reservoirs, open at the top, built of masonry, and rendered tight at the bottom and sides, by means of an excellent cement: about five metres of water are introduced into it.

When this quantity is exhausted, wells of three metres in depth are dug, which furnish an abundant supply. It is not at all extraordinary that the water should flow into these artificial cisterns, as they are dug in ground saturated with water during four months of the year, the lower bed of which being composed of a viscous clay, becomes capable of retention.

SECT. - IV.

Formation of Lake Menzaleh.

IN consequence of what we have said relative to the direction of the Tanitic and Mendesian branches in ancient times, it appears that these traverse the spot now covered by lake Menzaleh. This, then, is not a maritime lake, similar to those

those on the coast the *ci-devant* Languedoc and Roussilon ; it has not, therefore, always existed : but what may be the cause of its formation ? This is precisely what we shall now endeavour to explain.

I have already observed that this is not a maritime lake. The nature of the bottom of the Menzaleh, which every where abounds with the slime of the Nile, and also the depth of its waters, which generally amounts to a metre, while it is still more considerable in the presumed direction of the Tanitic and Mendesian branches, evidently announce that the basin of the Menzaleh has been formed by the overflowings of the Nile, and not by any commotion on the part of the waters of the sea.

I must observe, in the second place, that this lake could only have been formed in consequence of the rupture of equilibrium between the sea and the Tanitic and Mendesian branches. According to Herodotus, the Phanitic branch, or that of Damietta, having been dug by the hands of men, cannot have been near so considerable as it appears at this day ; it is probable that its volume has been augmented at the expence of the Pelusiac, Tanitic, and Mendesian branches ; and in proportion as the two last became impoverished, they

were

were no longer in a situation to preserve an equilibrium with the waters of the sea, in consequence of which, its waves have penetrated thither. They would experience less opposition in respect to this, as the north-west wind, which blows constantly, during many months of the year, on the coast of Egypt, by elevating the level of the Mediterranean, determines its waves, as we have already observed, towards the land. The action of this wind is so violent in the neighbourhood of Damietta (and it is, of course, the same elsewhere), that the largest trees, such as the sycamores for instance, bear towards the south, while their heads, which are deprived of branches on the northern side, are rounded and shorn as if they had been cut by shears.

Two modern facts relative to Egypt support our conjectures.

At the beginning of the present century the sea made an irruption on the shore between Alexandria and Rosetta, and there formed several violent currents *. At a nearer period, when it was attempted to re-open the canal Fara'ouny (the canal of the Pharrocks) the waters of the Nile precipitated themselves in this new direc-

* See Paul Lucas, vol. 2. p. 19. and seq.

tion, the branch of Damietta experienced a diminution, the waves penetrated a considerable way into this branch, and the ravages became so great, that they were soon forced to shut up the entrance of this channel, which they had opened without taking the necessary precautions. It is probable that the lake of Bourlos has been formed in the same manner.

In respect to the damage done to the land in consequence of the irruption of the waves, and their commotion in the basin occupied by the lake Menzaleh, did not the rupture of the dykes of the Meuse, about the year 1430 or 1440, convert into a large lagoon, abounding with barren islands and shallows, which are now navigable, an immense extent of country, including more than one hundred villages, and much land capable of cultivation: this marsh bears the name of *Bies Bos*: that is, the forest of bull-rushes.

The increase of the branch of Damietta is not, the only cause of the failure of the Tanitic, Pelusian and Mendesian branches: the bad management of the rivers, and the neglect of the canals, have contributed to it, as well as the position of the country.

Upon a proper examination of the isthmus which divides the Red Sea from the Mediterranean

ranean, it will be seen that mount Mokatham and mount Casius (Louga) are the promontories of that sea of sand; and the point which almost insensibly unites them (scarcely perceived by the eye, but which nevertheless exists in nature) marks the separation of the gulph of *Soues* (Suez) from that of Gaza. Thus, topographically speaking, the Nile rather belongs to Africa than to Asia *. The Nile running at the back of the mountains on the side of Africa, should have its course towards the west; since it is known that the waters of a river are subject to two declinations, the one in the direction of their length, and the other depending on the general topography of the country, which latter determines the principal current of this river, by more particularly affecting that of the two shores, which are contrary to the general declivity of the country.

When the principal current meets with a counter-current, as happens in the Rhone, which is supplied from the mountains of the *ci-devant Vivarais*, it is not then so easy to form canals which originate from the coast; but at the same time no bursting of the banks need be dreaded; but the contrary takes place in different circum-

* It is known that the Nile formerly divided Africa from Asia. See Pliny.

stances. Nevertheless there is nothing to prevent the direction of a river from being changed by appropriate works.

What we have already said appears to be confirmed in Egypt. The works of the canal of Youçef, of the lake Mæris, and those of the pier, which an ancient king of Egypt caused to be built, *, in order to turn aside, upon the right bank, the river which runs among the little hills of Lybia, and by that means struck with sterility all the eastern part of the Delta.

In all cases, the placing of bridges, of banks, piers, and other preservative works, ought to be subordinate to the considerations which we have already stated; for nature will not be contradicted with impunity.

Although the topography of the district may have contributed to the suppression of the Pelusian, Tanitic and Mendesian branches, the waters of the Nile have not the less preserved a tendency towards those branches; so that it would not be impossible to re-establish them. One circumstance alone, that of the elevation of the bed of the Nile, which ought to produce an elevation in the height of the waters, renders this opinion

* According to Herodotus, it was *Menes* who constructed that fine work.

extremely probable. By re-establishing the Tanitic and Mendesian branches, the lake Menzaleh would be drained. But, in order to judge of the means which ought to be employed for this purpose, it may be proper to examine in what manner the Delta was formed: these two questions have an immediate connection.

SECT. V.

The drying up of the Lake Menzaleh.

The physical property of banks for the purpose of regulating the course of a river is to contract the volume of its waters, and consequently to augment their depth; and since a river so regulated abounds with mud, the effect of these banks is to raise the bed of the river, because the waters deposit much less mud than if they were diffused over a larger surface.

Before the Mincio and the Po were banked, the deeps (*crues*) did not extend up to Mantua *, but now they reach even to Lake Inferior.

Since 1607 the beds of those rivers have been raised twenty-three decimetres one-third, by the

* Bertazzolo, *Del Softegno di Governolo.*

deposit of mud *; and, as in great inundations, the waters of the Po reach the height of the Superior Lake, and the difference of level of the lakes is two metres, we see that since the Po and the Mincio have been confined within banks, or dykes, the Po rises to the height of 43 decimetres, which it by no means reached formerly.

It follows, that since the low plains adjacent to the course of this river have not been inundated, either by its waters, or by those from other quarters, the bed of the Po is elevated above them; and these plains dried up by draining, are perpetually threatened, during the floods of the river, with a total submersion, by the bursting of the dykes †.

The effect is the same in the countries which are watered by the banked rivers of Italy, Holland, Zealand, and Maritime Flanders, those deltas, formed by the deposits of the Rhine, the Meuse, and the Scheldt, but which have been

* Abbati Mari, Mantovano, *Idraulica practica ragionata*.

† Citizen Dolomieu has given similar views of this subject, in his excellent memoir on Egypt, published in 1794. I am extremely flattered by finding that my reasonings agree with those of that able naturalist, with whose work I previously wished to become acquainted.

preferred by the banks from subsequent inundations, exactly in the same circumstances.

I conclude then, that *when a low plain washed by the sea, is crossed by rivers, which bring with them much mud, and is elevated to the height of the greatest floods, such plain must have been formed by deposits from inundations.*

Now let us apply to the Nile what we have just said of the Po. We can the more easily form a comparison between these two rivers, because they have each of them long courses, abound with mud, have periodical inundations, and run into the same sea.

Before the course of the Nile was regulated, the waters, issuing from the mountains, diffused themselves like those of the Po, upon a great surface, which they inundated during the whole year. Sesostris collected the waters of the Nile into channels below Memphis, confined them within banks, and in this manner formed several deltas. Now, if the ancient Egyptians had excluded the waters of the river from those deltas, not only, from the nature of the climate, would they have been deprived of cultivation, but agreeably to the principles I have just laid down, instead of seeing the Nile run between natural

banks, we should have had a river confined by artificial dykes, which would have held possession of the soil of Egypt.

Let us conclude then that the deltas of Egypt has been formed by inundations, favoured by the labours of man.

The deltas, too much limited between the two present branches of the Nile, ought to be considered as bounded by the mountains which stretch to the west, towards Alexandria, and by the hills which form the termination of mount Mokatham. The direction of the ancient branches whose regularity indicates the labour of man, announces that the extent which the ancient Egyptians had attributed to the Delta was the design of nature.

After what we have said, the draining of lake Menzaleh is reduced,

1st, To find the direction of, and to dig anew the Tanitic and Mendesian branches.

2dly, To introduce into partial deltas the waters of the Nile, during the inundations, in order to obtain mud. This can be done without danger, because there is an immense discharge of the waters of the Nile, by the branch of Damietta, and the canal of Mo'ez.

3dly,

3dly, To make cuts, shut with flood-gates, in the part of the country between the restored branches of the river.

4thly and lastly, To open the flood-gates, when the waters of the sea retire from the coast, in order that the waters of the Nile may flow out after they have deposited their mud.*

All these operations, though practicable, require to be performed with much skill and caution, that the Damietta branch may not be too rapidly exhausted. The channel of this branch must afterwards be narrowed.

Herodotus was the first who maintained that the Delta was formed by the river Nile. This opinion has been disputed by modern authors. Freret (*Memoirs of the Academy of Inscriptions*, 1742), seduced by the spirit of system, has combated it with the greater zeal. He has gone so far as to doubt whether the mud which the Nile carries down in its inundations, can form a de-

* The Translator has endeavoured to do almost *literal* justice to this memoir; but cannot flatter himself with having always perfectly understood the original, which certainly is not remarkable for perspicuity, much less for elegance or solid reasoning. It is one of the few, in this collection, which bear evident marks of having been too hastily written.

posit. But how have the canals of Egypt been filled up, if not by the slime of the Nile? Why suppose that the waters which spread laterally, and which are, of course, less rapid, should not deposit the substances with which they are charged, while this deposit is performed by the waters confined in the different channels of the Nile, the rapidity of which is less subject to change?*

Herodotus was also the first who discovered the cause of the formation of springs, which was not confirmed until the last century, and of which Descartes gave an ingenious, but little probable explanation. Thus we no longer doubt the existence of that beautiful mechanism, the circulation of the waters of the mountains towards the sea, and of the waters of the sea towards the mountains, determined by evaporation and by the intervention of winds and hills. The influence of opposite temperatures ought also to be added; for I believe it may be asserted, that *in a central*

* There was found at Rosetta, four feet under ground, a slab of granite with three inscriptions, one in hieroglyphic characters, another in Syriac, and a third in Greek. The Greek and Syriac inscriptions express the same thing viz.—*That Ptolemy-Eupater had employed seven years and a half in clearing out all the canals of Egypt.*

and

and elevated chain the clouds do not pass the line of the middle of the suspended waters, because that line separates two climates. The necks of the mountains are the parts most accessible and penetrable from this line; and though not so elevated, they are not the less placed within the vortex of atmospheric revolutions.

This principle, combined with the explanation of the prevailing winds of the solstice, accounts for the periodical rains which occasion the overflowings of the Nile, and afterwards those of the Niger, a river which flows behind the mountains of Ethiopia.

The manner in which we have explained the formation of the Delta leads to a conclusion, that the bottom of the Nile is raised in proportion as the adjoining soil is elevated. But what is the relation between the increase of the soil and the increase of the bottom of the river? and what is the probability that the inundations of the Nile may not either prove insufficient or be too great? These questions are not easily resolved.

It is certain, however, that in ordinary inundations, the waters of the Nile by no means cover the whole of the soil of Egypt, and it appears that this was also the case in the most distant periods.

The

The ancient Egyptians were convinced, that it was necessary they should be able to direct the waters of the Nile, lest some portions of their territory should be deprived of one of the principles of vegetation. Historians pretend that lake Mæris was dug to regulate the inundations of the Nile. The waters which flowed into this immense reservoir, and which were retained or distributed at pleasure, by means of the canal of Youcef, supplied, it is said, the deficiency of imperfect inundations, and when the flux was extraordinary, delivered the soil from the waters by which it would have, otherwise, been too long covered. This may be considered as the most sublime idea that ever was started, and at the same time, the best calculated to promote the true prosperity of a country.*

The canal through which the waters of lake Mæris, or rather those of the Nile, flow into Upper Egypt, and to lake Marcotis, still exists, but is much wasted towards the end of its course.

* In the paper on *the valley of the lakes of Natron, and on that of the waterless River*, it will be seen what opinion has been formed with respect to lake Mæris, and the primitive system of the waters of Egypt.

The

The part of the province of Behhyreh, adjoining the desert, which its waters formerly fertilized, is now uncultivated.

SECT. VI.

Nature of the Tongue of Land which separates Lake Menzaleh from the Sea.

FROM what we have said in this essay, it appears that the geology of Lower Egypt depends upon very simple principles. Great currents, volcanoes, earthquakes, and those violent storms which are regarded as melancholy events, and the recollection of which is long impressed on the mind, being unknown to Egypt, the strata must preserve the general affections of the substances of which the soil is formed, and the modifications of these strata must follow the action of the elements (which, in this country, is always uniform) combined with the laws of motion, and the resistance of the obstacles opposed.

The rains, which fall regularly every year during the summer solstice, on the mountains of Abyssinia, rob those elevated ridges of their soil, to enrich the valleys of the Nile and the Delta.

The matter carried down by the Nile is deposited at every point where the rapidity of the current

current is diminished. The soil, over which the water spreads, becomes more elevated. The deposits also form banks of sand which produce changes in the course of the river, assist in the formation of bars, and the extension of shoals.

During tempests the winds raise the sands from the bottom of the sea, and drive them towards the coasts. At low water the wind again seizes the dry sand, and blows it into the mouths of rivers. Thus shoals and downs are formed, and bottoms covered with concealed rocks are converted into flat shores.

The lateral current which follows the coasts of the Mediterranean, from west to east, combines with the course of the branches of the Nile, and, in consequence of a diminution of rapidity, produces on the left, between the two principal currents, an accumulation of soil which shoots out into points more or less acute, while the shore to the right, included between the direction of the course of the river and that resulting from both currents, assumes a round form.

The substances carried forward by this combined motion contribute to the extension of the shores, particularly those on the right, from which originate the elevated points that appear
between

between Damietta and Pelusium, as well as the funk rocks, and that long ledge which is prolonged under water, and which prevents any good anchorage near the coast. The nature of those anchoring-grounds is likewise subordinate to the direction of the sands and slime of the river. The bay of Damietta, on the left of the mouth of the Nile, has a hard bottom of black clay, while the bottom of the roads of Bougafeh and of Cap-Bouyau, situated to the right, consists of soft, yellowish mud, and here vessels sometimes give chace to each other for two or three leagues, without incurring danger.

Analogy induces us to believe that the shores which connect Cap Bourlos and Behhyreh with the branches of the Nile, owes their formation to similar causes.

Finally, the lateral currents, during their ordinary motion, or when acted upon by the westerly winds, meeting in the Gulph of Ghazah, form agitations, the effect of which is too little known and too little studied, but which contribute to the extension of that shore.

Meanwhile, if we consider that from the Delta to the summit of the Abyssinian mountains, the Nile flows between two ridges of hills which are calcareous as far as Açouan, and formed of granite

nite in the upper part, we will have a pretty good idea of the geology of Egypt. The hills which skirt the deserts of Lybia on the side of Lower Egypt appear to be sandy: they are covered with quartzous gravel, but the nucleus is calcareous rock. This is obvious on descending into the wells of the mummies of birds above Sfakharah, on entering the catacombs adjoining the pyramids of Djyzeh, or on examining the sphinx, and even the soil on which the pyramids are erected.

SECT. VII.

Notice on the Towns which communicate with Lake Menzaleh.

The part of Egypt which I have visited exhibits every where the appearance of a great depopulation. The towns of this district, situated on the way from Syria, lay in the path of conquerors, and must have suffered from the presence of invading armies principally composed of barbarous people, and commanded by such chiefs as Cambyses or Omar. But the principal cause of their decay has doubtless been the suppression of the Pelusiac, Tanitic and Mendesian branches of the Nile.

On the banks, or in the neighbourhood of these

these branches, there were considerable towns, such as Tennys*, Tounah, Samnah, Pelusium, and others of less importance.

The ruins of Tennys and Tounah are now surrounded by water, and belong, as we have said, to Lake Menzaleh. Like all the towns which were subject to inundations, they were built on causeways. The soil, interspersed with ruins, is at present entirely uncultivated. A kind of cristalization has covered the surface, and the earth crackles and crumbles under the feet like snow which has just begun to freeze. This renders travelling very disagreeable in these islands.

Tennys was a large city; a wall flanked with bastions, and a ditch filled with water, served to defend it. Now it does not present a single habitation or vestige of baths; subterranean ruins, vaulted with much art, the walls of which are lined with a very hard cement in excellent preservation; fragments of a rectangular basin of red granite: such are the only objects that can be distinctly traced in the midst of immense ruins of bricks, porcelain, pottery, and glass of every colour. The people of the surrounding country

* Tennys, a Roman town, built on the ruins of an Egyptian city, flourished in the time of Augustus.

are constantly exploring this isle, whence they dig up materials proper for building their habitations.

In this manner are conveyed the columns, pedestals, capitals, and other remains of antiquity, which are placed in so barbarous a manner in the mosques and principal edifices, or introduced into more ordinary buildings. Thus the site of the entrance of the branches of Damietta is a fragment of a very fine obelisk, ornamented with hieroglyphics. We also found in that city a door-way, on each side of which was a pedestal full of inscriptions, the one in Greek, the other in Latin, and in a mosque a column of ruined grey marble, with a Greek inscription a little defaced.

Tounah was a less considerable place than Tennys. In the former we were so fortunate as to meet with an antique cameo, lying on the ground.* It is of agate, measures 36 millimetres by 29, and represents the head of a man in profile, which has a great deal of character. Its penetrating eye, frigid air, and disdainful lip, afford reason to imagine it was intended for that Augustus who resisted Cleopatra's charms, and

* This cameo is now in the possession of Madame Bonaparte, to whom it was brought by the General.

furmounted every obstacle that separated him from the possession of power.

Samnah* stands on the banks of the canal of Mo'ez. It appears to have been an immense city, and to have extended a considerable way along the canal. Within its confines is a kind of forum or public square of an oblong form with a grand entrance towards the canal of Mo'ez, and avenues on each side. The longer axis of the parallelogram is east and west, and on this line are various monuments of antiquity in ruins, and obelisks broken and thrown down. When we reflect on these immense remains, our wonder is equally excited at the efforts necessary to break them so near their bases and throw them down, and at the means that must have been employed to raise them. Time has spared the hieroglyphics on one of these obelisks, of which a drawing has been taken.

Samnah is now the market for dates brought from Sfalehhyeh by the fishermen of the lake, who take them in exchange for their salt-fish.

Pelusium† is situated at the eastern extremity of

* Samnah, (San) was the ancient Tanis, called in the Septuagint translation of the Bible, which was made in the country, Tzoan (*Zoαν*) whence comes San. (*d'Anville.*)

† So called from the Greek word Πηλεύσιον, meed. The Arabs preserve this appellation in its present name Thyneh.

the lake Menzaleh, between the sea and the sand hills, in the middle of a smooth, naked, and barren plain. The extremity of the Pelusian branch, which is now almost entirely reduced to a great channel of mud, traverses this plain from the lake to the sea. The castle of Thyneh, which is falling to ruins, is on the bank of this channel, but at a considerable distance from the shore. It appears to have been built about the time of the conquest of Selim. The ruins of Faramah are to the eastward of Pelusium toward the sea.

After passing the bar at the mouth of the Pelusian channel, there is, for a certain space, depth of water sufficient to shelter a flotilla of little vessels. It was from this place that the vessels of the lake of Menzaleh carried on a contraband trade with Syria.

The road that leads from the mouth of Omm-Faredje to Katthieh (Qathy'eh*) passes to the westward

* Katthieh (Qathy'eh) seems to be the place which Quintus Curtius (lib. iv. c. 7.) calls Alexander's camp. "Seven days," says that writer, "after the departure of Alexander from Gaza, he arrived in that part of Egypt now called the Camp of Alexander. Thence he caused his infantry to file off towards Pelusium, and embarked on the Nile with a small escort of chosen men." Katthieh, on account of some very abundant wells, was the only place

westward of Thyneh, and through Pelusium; but is extremely muddy, and it is better to go nearer to the Pelusian mouth.

We may shew by the way that the elevation of the sand-hills to the eastward of Pelusium, and which extend upward towards the province of Charqyéh, show that the canal of junction between the Arabian Gulph and the Mediterranean Sea, could not end any where but at the Pelusian branch, and at a considerable distance from the mouth of that branch. Hence this canal must have been carried from the Nile, towards the Red Sea, and the fear of an irruption of this sea towards the Mediterranean (which, however, I imagine unfounded, and which might have been prevented by proper sluices) thus becomes much less probable.

On the plain of Pelusium, going from the sea toward the sand hills, and till within a small distance from the latter, are found shells, at first in great abundance, but afterwards in smaller

place the Macedonians could find for an encampment, the seventh day after their departure from Gaza, and it is also the nearest point for troops to file off upon Pelusium. The march from Gaza to Katthieh (Qathy e'h) which the soldiers of Alexander performed in seven days, was accomplished in six by those of Bonaparte.

quantities ; the ground is also covered throughout its whole extent with a saline crust. Thus every thing shows that the sea flows in there, and continues to cover the land during a part of the year, probably at the time of the summer solstice. The exhalation is very great in the plain of Pelusium, and half an hour after sun-rise all objects appear so much distorted that they cannot be distinguished.*

Strabo informs us, that in his time Pelusium was 20 stadia in circumference, and stood at a like distance from the sea.

In fact the whole length of wall that surrounds Pelusium is 20 stadia; but the sea is now four times more distant than in the time of Strabo : so that if we draw a curved line at 60 stadia from Pelusium, to meet the most advanced point of the coast to the left of the mouth of the canal of Omm-Faredje, we shall have the extent of land

* This phenomenon was also remarked by the ancients. Quintus Curtius (lib. vii. c. 5.) says, that " In the deserts of Sogdiana, the heat of the sun in summer burns the sand, and a fog which rises from the heated entrails of the earth, obscures the light, so that the fields appear like a vast extent of sea."

Citizen Monge has inserted in this collection a very well written memoir on this phenomenon, of which he has given an explanation.

formed by the sand and earth deposited on its right the lateral current which runs along the coast of the Mediterranean from west to east. Thus the long canal of Omm-Faredje which is evidently of recent formation, will disappear, and the island of Tennys will be brought two leagues nearer to the sea, a situation which coincides better with that assigned to it by the ancients.

On the plain where Pelusium is situated are not the least traces of vegetation. There is however, an insulated knoll crowned with shrubs, and a few birds are the only guests that enliven the foliage or the desert that surrounds it. But the astonished Traveller perceives no other traces of an immense city and its vast population, than a few miserable ruins and columns that lie buried in the earth. In vain may he search for any traces or remains of a warrior who was long, happy, and successful, but who at length was forced to yield to the better fortunes of Cæsar. No, he will find nothing but the ideal memory of that celebrated hero, who fell a victim to ingratitude by the basest of assassinations.

A monument near the shore where Pompey landed would awaken innumerable interesting reflections;

reflections;* it would also commemorate the æra when the descendants of those Frenchmen who completed the destruction of Pelusium† recovering from an immortal struggle against a coalition of all Europe; after having passed the Mediterranean and penetrated into Alexandria, came, after an interval of six centuries, not like fanatical knight-errants, but as warriors who are friends to mankind and to the arts, to signalize the other extremity of the basis of Egypt, and the two routes that lead into Asia and to India.— They have trod the burning soil of Nubia, and will seek to dignify their steps in these countries by a still more honourable monument, the civilization of the nations of the East.

SECT. VIII.

Analysis of the Construction of the Charts of the Lake of Menzaleh.

IT remains that I give some account of the manner in which our chart has been constructed, and compare it with that of d'Anville.

* On such a monument the following very simple inscription might be engraved:—*Bonaparte to the Memory of Pompey.*

† The Crusaders.

The vicinity of Damietta, and all that part of the peninsula comprised between the canal of Kassab-el-Kache, the river Nile, the waters of the lake, as far as the Phatnitic mouth, and to the point of land to the west of the river on which stands the tower of Beughaz, were constructed by pacing (*au pas*) and by compass. The gulph of Minyeh, the island of that name, those of Tal and Dorbetta, the position of Sheyk-Shata, and the bearing of Sheyk-el-Saby, were determined by means of bases taken on the peninsula of Damietta.

Taking our departure from the Phatnitic mouth, opposite the square tower, the bearing of the coast, the opening of the mouths, the directions and the breadth of their channels, comprising the Pelusian mouth, were determined, with all possible exactness, by more than 130 intersections, the distances of which were measured with the chain. The breadth of the slip of land which separates the sea from the lake, was determined in the same manner.

The visible points of the lake, such as Sheyk-Bourdadi, Sheyk-Aboulef, Sheyk-el-Saby, of which we had only taken the bearings near Damietta, were accurately determined.

The environs of Pelusium, the ruins of that town,

town, those of Farama, and of Thineh, the line of the great downs which rise towards Syria, the direction of the ancient Pelusian branch, and the coast of the lake in that part, were determined by the compass, and the distances measured with the chain.

All the part comprised between Matarieh and Menzaleh, Sheyk-Nabaleh, and the direction of the coast in that part, were determined by the compass and by pacing: and from thence we fixed, by means of bases, the position of the island of Thouna, and of Sheyk-el-Saby.

Thus we had a separate chart, which had the point of Sheyk-el-Saby in common with the first chart; and by determining this last point, the two charts were perfectly consolidated. The island of Tennys was placed at the intersection of the visual rays directed to that island, by Thouna and Sheyk-Nabaleh; the angle being very acute, we reconciled its position with the distance previously known by the traverse.

The direction of the canal of Mo'ez, the position of San (Samnah), and of all the neighbouring places, the bearing of Salehieh, were determined by the compass; and the distances were estimated agreeably to the information furnished by the Sheyks of the country.

The

The following are the principal dimensions of the lake of Menzaleh :

The distance from the anchoring place of Minyeh, near Damietta, to the arid plain which surrounds Pelusium, is 83,781 metres, or 43,000 fathoms.

This direction, which is at the same time the general direction of the coast along the lake, is W. N. W.

The distance from Matarieh, to the entrance of the canal of Debeh, is 22,377 metres, or 12,000 fathoms.

The distance from Matarich, to the entrance of the canal of Omm-Faredje, is 50,269 metres, or 26,800 fathoms.

The first distance measured upon a line parallel to the coast, is the greatest dimensions of the lake.

Comparison of the Chart with that of D'Anville.

In D'Anville's chart, there is no mention made of the two Matariehs which are the most considerable villages on the lake, on account of their position, and their numerous population ; the position of Tennys is very near the truth ; but the island of Thouna, which is on the west of

Tennys, is placed on the south-east of it. Besides, the form of the lake is altogether different in D'Anville's chart. That geographer includes the basin of the lake in the portion of a depressed arch subtended by the coast, or rather upon the slip of land which separates the lake from the sea, and to which he has assigned too great a breadth; at the same time, that in the chart lately constructed the contour of the lake is formed of two joining arches, the ends of which exactly meet.

If we now compare the windings of the coast in the two charts we shall find

	By d'Anville	Modern.	Difference.	
			Eccels.	Defect.
Fathoms	Fathoms	Fathoms	Fathoms	Fathoms
From the square Tower to the mouth of Dybeh . . .	17,850	15,723	2,127	
From the mouth of Dybeh to that of Tennys . . .	16,320	22,120		5,800
From the Tanitic mouth to that of Pelusium . . .	22,950	7,564	15,386	
Total of the windings of the coast exclusive of the breadth of the mouths. . .	57,120	45,407	11,713	

The

The total of the windings of the coast, including the breadth of the mouth, is 45,677 fathoms, or 89,087 metres.

I must not conclude without paying to my colleagues the tribute of praise which they merit, for the intelligence, zeal and activity with which they seconded my efforts*. They have additionally proved, that they knew how to reconcile exactness of operation, with the celerity which pressing military dispatch necessarily required.

The chart annexed to the memoir, although more exact than D'Anville's, would have been improved by including in its construction the position astronomically determined by Citizen Nouet.

APPENDIX.

The following is nearly the population of the towns and villages adjoining Lake Menzaleh ; I say *nearly*, because, on account of the prejudice against an enumeration, nothing can be ascertained on that head ; and the information which we obtained was extremely vague.

* Citizens Fevre, Potier, Bouchard, Tirlet, and Sabatier.

Lefbeh	- - - -	250	At Alhouet	- - - -	100
Efbet et Keta	- -	150	Affakaria	- - - -	100
Efbet inamiora	- -	150	Rahamiyeh	- - - -	150
Efbet Karnouniyeh	-	200	Menzaleh	- - -	8,000
Damietta	- - - -	18,000	Canton of Menzaleh	-	500
Zenanieh	- - - -	300	Nasseimi	- - - -	200
Minyeh	- - - -	150	Obon et Lam	- - -	100
Shouara	- - - -	1,000	Mattharieh	- - -	3,000
Kassab-el-Kache	- -	120	El-Malakaime	- - -	80

Total - - 32,650 Inhabitants.

MEMOIR,

*On a Journey made, in the end of Frimaire, on the
Tanitique Branch of the Nile.*

By Citizen MALUS.

ON the 25th of Frimaire, Citizen Fevre and I set out from Cairo, with a view to examine a supposed communication between the Nile and the Lake Menzaléh. The object of our journey was to ascertain, whether or not that canal was navigable, at what time of the year it ceased to be so, and to make observations on the surrounding country.

In order to arrive at the object of our journey, we traversed the whole extent of the province of Kelyoubéh, which we found abounding in grain, pasture, and woods of different kinds. The villages are large, the flocks numerous, and a degree of security reigns among the inhabitants, which we did not observe in the rest of our journey.

We found the communication easy, till we proceeded a league beyond Kelyoub, where the country begins to be intersected by a number of trenches dug for the purpose of irrigation, but a free passage is procured at a small expence. The

R roads,

roads, although difficult, are agreeable. Most of them are bordered with rich gardens, producing trees and plants of different kinds, and others traverse thick woods and immense nurseries. The variety of the scene announces a kind of luxury in agriculture, which does not prevail in the other provinces through which we had passed.

On the third day of our journey, we reached the limits of the province of Kelyoùbéh, which terminates at Atryb. This little village is built at the extremity of the ruins of a city, which appears to have held a distinguished rank. These ruins are six hundred fathoms in length, and four hundred in breadth. The scite of a royal palace, of the principal street and of a public square were pointed out to us. No trace of the palace can now be discovered: but the inhabitants affirm that, in digging the foundations of houses, they find large blocks of marble. It may be presumed, that they have converted those blocks into lime, and that all the calcareous stones discovered in the remains of this city have been put to the same use; for such appears to be the practice in all the towns in Egypt, and the remains of lime-kilns are still visible among the ruins of this. We also observed little subterraneous

terraneous vaults, similar to those in which the present inhabitants of Cairo deposit their dead, and these were probably intended for the same purpose. The traces of the great street are still very distinct, and form a right angle with the Nile, which washes the extremity of the ruins. Another less considerable street traverses the town, from south to north.

At the distance of a league from these ruins, stands the village of Mo'ez, and the beginning of the canal, which it was our intention to examine, and which bears its name for a part of its course. On the 27th Frimaire, when we arrived there, the Nile, at that distance from its mouth, was three hundred *metres* wide, and the canal fifty. A part of the waters of the river, directing their course towards the south-east, increased in rapidity in this new branch. At the first sight we suspected that this canal had not been dug by human hands, but that it was really a river; and succeeding observations verified our suspicion.

By accurate operations, we determined the situations and bearings of all the points in the vicinity of the origin of the canal, and from thence we began to construct the survey which was to accompany our memoir.

In the first six leagues we observed nothing remarkable. We constantly followed the course of the canal, and observed all its curvatures. The mean velocity of the current is about two hundred *metres* in a minute ; and its depth throughout, exceeds five *metres*. The plain which it waters is fertile and well cultivated. It produces wheat, maiz, or Indian corn, and sugar-canes, with some meadows interspersed. It is watered by a great number of canals, in which the water is retained by dykes constructed on the banks of the great canal. Many of them, in the season, when the waters are plentiful, may afford the means of communication with the interior country. Among the most considerable, is the canal of Fylfeti, half a league from the Nile ; then, at the distance of six leagues and a half is that of Zamkaloueh, which extends to the vicinity of Belbeïs. In the mouth of the first, there was at that time three feet water ; that of the second was elevated two feet above the level of the great canal.

At the height of Denyéh the canal is divided into two branches. We followed the eastern branch ; the western separates into many ramifications, which join lower down, to that which we surveyed.

At

At the point where these two branches separate, we saw the ruins of Thal Baftah, or of the ancient Bubafté, at a great distance. They are situated at the distance of seven leagues from the Nile, and half a league from the right bank of the canal. We there viewed many fragments of monuments which might illustrate the history of the Egyptian architecture. Among others, we observed a portion of a very massive cornish, the sculpture of which was in a state of high preservation. This fragment, which might be eight feet in length, and six in height, is composed of a very hard brown granite. The work upon it is highly finished, and it is covered with hieroglyphics, of which we have given a drawing. Among the hieroglyphics, or other masses of granite, we found some characters which were wholly new to us. One side of an obelisk, in particular, is wholly studded over with stars, representing the firmament. They have each five rays, two *centimetres* in length, and are joined in an irregular manner to each other. Enormous masses of granite, almost all mutilated, lie in astonishing heaps, and it is not easy to conceive what force could have broken and piled them on each other. Many of them have been made into mill-stones, some of which, compleatly cut,

have been left on the spot, doubtless from the want of means to convey them away.

This city, like all the other Egyptian cities, was raised on massive foundations of unburnt bricks. These bricks are about a foot in length, eight inches in breadth, and as much in thickness, and are precisely of the same material with that of the bricks now made in Egypt. The burnt bricks occasionally found, are very different from those used at the present day.

The extent of Bubaſté is about twelve or fourteen hundred *metres* each way. In the centre of it is an immense bafon, in the middle of which the monuments just described, are situated.

In this city, the feast of Diana, the principal one observed by the Egyptians, was annually celebrated. On that occasion, the concourse of strangers, according to Hérodotus, was not less than seven hundred thousand, exclusive of children. This feast was a kind of orgy, which resembled the Bacchanalia of the Greeks; and the ancients speak with astonishment of the quantity of wine consumed at it. In this city also were collected all the mummies of cats to be found in Egypt. That animal was held by the Egyptians, in almost as much reverence as the ibis; and they conveyed the mummies of the latter to

Hermopolis,

Hermopolis, and those of the former to Bubasté. Before the town, is a large island formed by the branch of the canal which we have already mentioned. The ancient name of this island was Miecporis. It formed a province inhabited by the Calasfries, a tribe destined solely to the business of arms; at present it is a well cultivated plain, and contains great woods of palm-trees and some very rich villages; among others Guényéh, which gives its name to the western branch of the canal.

At the distance of three leagues from Bubasté, and upon the same side of the canal stands the little modern town of Heihéh, which is very populous, and is surrounded with a thick forest of palm-trees. It is also encircled by a wall fifteen feet high, in very good repair, furnished with battlements and flanked by substantial towers with double parapets. The gates are in the form of *tambours*, which flank a part of the curtain. This little town appears to carry on a very considerable trade; and there were at that time under its walls, thirty large boats, laden with cotton, dates and grain.

From this town, to the lowest extremity of the canal, we observed on both its banks, a great number of towers, constructed without either

doors or windows; but they are furnished with port-holes and battlements, and serve as places of refuge for the inhabitants, when surprized and pursued by the Arabs of the desert.

Beyond Heihéh, in the midst of a low swampy plain, stand the ruins of a town, which the inhabitants of the village of Orbet, founded upon them, told us, was Kourb. We found there the foot of a colossus, and the trunk of a statue; also some pieces of columns and fragments of granite.

This town could not have been considerable, nor as we judged above a fourth part so large as Bubasté. The inhabitants told us that it was founded by an European, long before the days of Mahomet. But this opinion of theirs is not probable; though it be also entertained by the inhabitants of the ruins of Atryb.

A league farther, on the opposite bank, stands a rich village called Kafr-Fournighéh, which is considered as the limit of the civilized country. The barks of the Nile never dare to descend below it; nor those of the lower country to proceed above it. The villages which we visited beyond that point, appeared much less opulent; and the land was more uncultivated, although the soil was equally good. The country is much thicker set with towers; every habitation is surrounded with

solid

solid walls, and each village has but one gate ; and almost all the inhabitants go armed, even when employed in the labours of the field.

We found the canal narrower, after we passed Fournighéh, where its breadth is only about sixty *metres*, its depth being still the same. When it approaches the lake Menzaléh, into which it discharges its waters, the depth becomes about twelve feet. From El-Orbet, the country is intersected with a multitude of canals, ponds and marshes, which render travelling difficult in the extreme. Many of these ponds retain their waters for six or eight months in the year. Opposite to El-Labaïdy, on the left bank, is a very large lake, extending to Aboù-dàout, which communicates by many openings with the canal, and which preserves its waters for eight months, during part of which it is navigable. This lake, though separated from that of Menzaléh only by a narrow stripe of land, has no communication with it.

Two leagues from the extremity of the canal, and on the right bank, we surveyed at different times, the ruins of San, or Tanis, which several persons have already visited. We found there only seven obelisks, partly broken, a capital of a column, of the order since called Corinthian, and a

monument

monument of granite, broken in two, which we presumed to have been sepulchral. We also met with some fragments of vases, composed of a very fine earth, and some of them coated with a varnish, which is not yet decayed ; to which we may add burnt bricks of different kinds, and bits of glass and crystal, extremely well polished. Beyond this point, and as far as the lake Menzaléh, the plain is very low, and almost wholly inundated ; and it is intersected with a multitude of canals, crossing one another in all directions. Fronting San, there is a little canal leading to Salehyéh, which is navigable only for one month in the year.

Thus we reached the extremity of the canal ; having assured ourselves that it is navigable throughout its whole extent. After having collected this general information, we learned more particularly, that it was practicable for large *jermes*, only for eight months in the year. After that period, it may, for some time, be navigated by little light boats ; but this only in the lower part of the canal. For nine months of the year, the waters of the Nile flow freely towards the lake Menzaléh, and during the three last months, the waters of the lake flow back into the interior country. To provide against this inconvenience,

venience, a bank is yearly constructed, which lasts three months. But, notwithstanding this precaution, the salt water still flows back to the distance of seven or eight leagues; and opposite El-Labaïdy, where there is but a foot of water, it is entirely salt.

Such is nearly the sum of the information, which we collected respecting this canal. From its breadth, its soundings, and the great number of ruins on its banks, we may almost conclude with certainty, that it flows in the channel of the ancient Tanitique branch of the Nile. To prove this, we need not repeat the observations which have been already made and communicated in another place.* We shall also waive any remarks on the junction of this branch with the lake of Menzaléh, and the means of communication between Damietta and Salehyéh, which the lower canal might afford. As to the communication with Cairo, we shall only observe, that it would be easier and more simple, to pass directly to San by Mo'ez, than by the lake Menzaléh. By this means, the necessity of unloading at Damietta, land carriage to the lake, and re-loading on its banks, would be avoided, which would be a saving of time and expense. The

* See the Memoir on the Lake of Menzaléh, § 1.

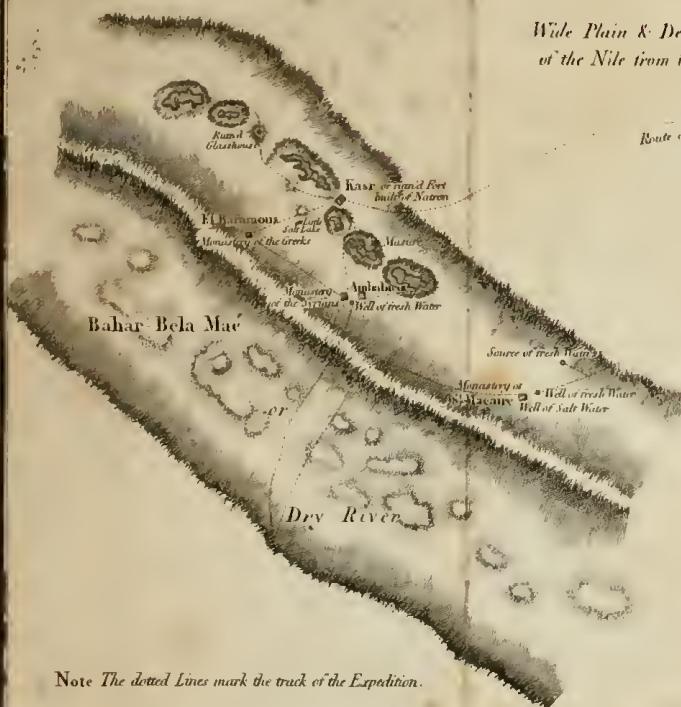
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reason why so little advantage has hitherto been derived from this communication, is to be referred to the depredations by which it is continually infested, owing to the want of a public force to restrain the rapacity of individuals. Hence proceed hatred between the different villages, and a petty warfare, which hath put an end to all confidence.

When a system of government and police shall be extended to those parts, property becoming more secure, mutual confidence will be restored, commerce will resume a new activity, immense tracts will be subjected to agriculture, the condition of the inhabitants will be improved, and riches and abundance will be diffused through that fertile country.



Expedition of Bonaparte in Egypt An 7 8



Note The dotted Lines mark the track of the Expedition.

Wide Plain & Desert separating the Valley
of the Nile from that of the Lakes of Natron

Route at setting out

Route of returning

MAP
of the Expedition to explore
the VALLEY of the
NATRON LAKES,
& that of the
DRY RIVER;
by
General Andreasy



Scale of Miles & of Leagues comprising 1500 Miles
Scale of 2000 Metres for one Kilometre

Kilometres 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 90 91 92 93 94 95 96 97 98 99 100

Particulars concerning the Valley of the Natron Lakes, and that of the old Bed of the River, collected during an Excursion thither on the 4th, 5th, 6th, 7th, and 8th of Pluviose, 7th Year.

By ANDREOSSI, *General of Artillery.*

THE only part of Egypt that Europeans in general are acquainted with, is the valley through which the Nile flows at present; there seems, however, good reason to believe from geological considerations, from the accounts of ancient historians, and of a few among the later travellers, that this river in some very remote period penetrated into the heart of the Lybian deserts, where the traces of its course may still be seen.

Herodotus affirms that the present basin of the Nile was originally a reservoir, constructed under the ancient kings of Egypt, a work of human skill and industry, probably the greatest upon record.

It is from the investigation of this primitive course of the Nile that we may expect to obtain the most correct ideas of the geology of Egypt, of the works that were undertaken to ensure

ensure its fertility, and of the most effectual method to repair the disorders which time, barbarism, and ignorance, have produced in a country destitute of rain, and which, without the annual inundation and artificial waterings, would be condemned to perpetual barrenness. This ancient bed of the river is distinguished among geographers by the appellation *Bahhar-bela-me* (*the dry river*) and is called by the natives of the country *Bahhar-el-farigh* (*empty river*). At no great distance are the lakes of Natron, the working of which, has been again resumed within the last fifty years, on account of the increasing value of their product in the various manufactories of Europe: in the same vicinity also were founded the convents of Coptic monks in the fourth century, a period when the active fanaticism of monastic institutions crowded the deserts of Thebais, with zealots and martyrs.

It was of importance to become acquainted with this part of Egypt, especially on account of the advantages that might be hence derived to geology and the arts; for this reason citizens Berthollet, Fourier, and Redouté, jun.* were

* A skilful artist in designing plants, animals, &c. especially fishes. Citizens Duchanoy and Regnault, the latter a pupil of Berthollet, were joined in the commission.

desired

desired to repair thither. A military force under my command accompanied them, for the purpose of protecting their researches in a district open to the incursions of the wandering Arabs; who, sometimes descending from Upper Egypt, and sometimes emerging from the deserts of Barbary, carry murder and devastation through the entire frontier. During the whole expedition, we carefully noted whatever appeared to us of any importance in our respective departments. I shall proceed to relate the particulars of our journey, leaving it to citizen Berthollet to present the results of his interesting experiments on the analysis of the Natron.

SECT. I.

CONCERNING THE VALLEY OF THE LAKES OF NATRON.

We set out from Terranéh on the 4th Pluviose at two in the morning, and, after a journey of fourteen hours, came within sight of the valley in which the Natron lakes are situated.

TOPOGRAPHY.

An extensive plain, about thirty miles across, divides the valley of the Nile from that of these lakes :

lakes : the surface of the plain, gently waved, and constantly parallel to the sea, is throughout nearly on the same level ; the soil firm and solid, is composed of gravel and rounded pebbles, consisting of flint of various colours, and agate. The west winds which blow here with great violence, have driven almost the whole of the loose sand across the hills which border the Nile, into the valley. The calcareous rock rising to the surface, here and there diversifies the view ; all the rest is unvaried desert inaccessible to vegetation, except to a few scattered shrivelled specimens of *nitraria* and *hyoscyamus*.

The impossibility of almost any animal subsisting on so arid a soil, was doubtless the reason of our seeing there only a few individuals of a single species of insect, the *mantis obscura*, whose name is emphatically expressive of the deep solitude in which it lives in the midst of this spacious desert.

The direction of our march from Terranéh was first from east to west ; but about two hours before our arrival at the valley of Natron, after having passed a low hillock called *Ras-el-Baharah* (*the cow's head*) our route changed to nearly north-west by west. We halted by the side of a *kaffr*, or ruined fort, situated on a gentle rise ; the

square

square enclosure and round towers which flanked two of its angles are built of blocks of natron, a sufficient proof of the infrequency of rain in this district. A little below, in the bottom of the valley, are seen the lakes of Natron ; in front, at some distance, on the opposite ascent of the valley is the convent of the Greeks or *El-Baramous* ; and on the left appear the neighbouring monasteries of the Syrians and of *Amba-Bicoi*.

We included in a triangle the convents of the Syrians and of *El-Baramous*, and the ruined fort, measuring the distance between the two last to serve for a base : the length of this was $7231\frac{1}{2}$ metres ; the distance, as found by calculation, between the fort and the convent of the Syrians was equal to $7430\frac{1}{2}$ metres, and that between the last mentioned place and *El-Baramous*, was equal to $9258\frac{1}{4}$ metres. The road from the fort to either of the other places lies across a tract of sand in some parts loose, in others firm and covered with saline efflorescences : a few plants are seen here and there ; banks of gypsum and limestone are met with through the whole district, and there is a ridge of excellent chalk between the two convents of the Syrians and the Greeks.

NATURAL GEOGRAPHY OF THE VALLEY.

The valley of Natron makes an angle of about 44 degrees west of the magnetic meridian; the lakes also lie in the same direction in the valley with regard to their relative position and their longest diameter. In the map of Father Sicard only one large lake is laid down at right angles to the direction of the valley; thus not only committing a local error, but in direct contradiction to hydrography in general. There are, in fact, six lakes, three to the north of Kaffr, and three to the south. The inhabitants of Terranéh indeed, reckon seven; the lake (No. 4.) having been formerly divided by a dyke, which is at present broken through. Danville, on the authority of Strabo, makes two lakes, but in the same direction as Father Sicard's.

The lakes comprise a surface about six leagues in length, by six or eight hundred metres in breadth, from one side of the valley to the opposite; they are separated from each other by banks of dry sand. The two southernmost are called *Birket-al-Deouara* (the lakes of the Monasteries), the remaining four have no particular appellation.

appellation. The Sammalou Arabs* carry on a contraband traffic with Alexandria in natron, which they procure from the northern lake (No. 6.)

Drinkable water, though brackish, is found along the lakes on the side nearest the Nile; these springs are very abundant during three months in the year, from the beginning of Pluviose; they then begin to fail, and some of the lakes are entirely dried up.

It is of importance to notice the natural state of these lakes. Their sides are hollowed out into small creeks, from the top of which the water flows, as is customary at the heads of valleys: each of these is occupied by a rivulet that discharges itself into one of the lakes; the ground above these springs in the lake (No. 3.), which we particularly examined, for an extent of about two hundred and fifty metres, is covered with saline crystals, among which grows, in considerable quantity, that kind of compressed rush, of

* The Sammalou as well as the Djeouaby Arabs, of whom we shall have occasion to speak hereafter, are a tribe of hospitable shepherds. They are governed by three chiefs, the principal of whom is Scheik Soliman-Abou-Demen. Their force amounts to about one thousand men and forty horses.

which the common mats of the country are made. The springs themselves occupy a tract about ninety-eight metres broad, and a band of natron thirty-one metres wide encompasses the edge of the lake. The dimensions of the lake itself are 514 by 109 metres; its greatest depth is half a metre; the bottom is chalk mixed with sand. The colour of the water in this single lake is almost that of blood.

The above is the state of the lake (No. 8.), on the side nearest the Nile. The opposite shore is mere sand, destitute of springs, and almost of vegetation. Whence originate the springs that feed these lakes? Do they come from the Nile by a slow filtration through the mass of desert thirty miles broad that separates the two valleys, following the general declivity of the country to the north-west; or do they rise at the head of the valley in the province of Faïoum, where it probably unites with that of the Nile? The second opinion, though the most natural, seems to be rendered inadmissible by the situation of the streams, which all originate from the eastern side of the valley: there are, indeed, a few springs on the opposite side, but very deep seated. A further confirmation of this opinion is, that the

rise

rise and fall of the waters of the lake regularly happen within a short time after the annual inundation of the Nile.

ANALYSIS OF THE WATERS OF THE LAKES.

The waters of the several lakes contain several salts, which differ in proportion, even in parts of the same lake, that have little communication with each other. These salts are always muriat of soda, carbonat of soda, and a small quantity of sulphat of soda: in some parts the carbonat of soda predominates, in others the muriat of soda.

It appears from the nature of the soil that the carbonat of soda is carried into the lakes by the water of the fountains which we have spoken of, or washed down by the rains; and this explains why the proportion of salt varies so much in different parts.

The waters of one part of the lake (No. 3.), and those of the lake (No. 4.), are tinged red by a vegeto-animal substance. On evaporating these waters, the marine salt, which crystallizes the first, retains this red hue, and at the same time acquires an agreeable smell, like that of the rose.

Citizen Berthollet is of opinion that the pro-

duction of the soda is owing to the decomposition of the sea salt by means of the carbonat of lime which is found every where in the moist soil in which these changes take place. The presence of moisture is absolutely necessary to the decomposition of marine salt, and this has always been found in these circumstances. As to calcareous earth, it abounds every where between the Nile and these lakes, as well as in the valley, where it appears as lime-stone rock or in the form of chalk.

MANNER OF PROCURING THE NATRON.

The working the salt lakes is one of the employments of the inhabitants of the Terranéh,* a canton which is included in the new boundaries of the province of Djyzeb.† The natron is only carried

* The canton of Terranéh contains six villages: Aboryat, Kaffr-Dâoud, Terranéh, Lagmat, Natagbe, and Abouniehabé.

† Under the dominion of the Beys the province of Djyzeb was bounded to the north by the Djesr-el-Ecoued, or the Black Dyke, which separated it from the province of Bahyreh. At present it extends as far as the village of Aboulgraoué. The Djesr-el-Ecoued crosses the plain from the sandy levels whence it begins, as far as the Nile. The extremity of this dyke, near the village of Omm-dynar is furnished with flood-gates to let off the waters brought by the

carried during the interval between feed-time and harvest.

The caravans assemble for this purpose at Ter-ranéh. Each caravan is usually composed of a hundred and fifty camels, and five or six hundred asses. It sets out with its escort at sun-set, arrives on the spot in the course of the next day, breaks up the natron and takes its lading, and returns without delay. On its way back the caravan halts at mid-day, and fires are made of the dung of the asses and camels of a former party.* The guards belonging to the escort and the drivers then drink their coffee, smoke their pipes, and make a few cakes with flour and water mixed on a wooden trencher, and afterwards baked over the fire. The captain of the troop then places sentinels for fear of a surprize from the Arabs, and the rest of the caravan sleep for some hours; they then resume their journey, and by the morning of the third day they are returned to Ter-ranéh,

the inundations of the Nile. These waters are kept in as long as is requisite, by the Djesfr-el-Ecoued, and thus render the plain highly fertile and productive.

* The great scarcity of fuel renders it on this account expedient for one caravan always to halt in the spot occupied by the last.

Every caravan is reckoned to convey six hundred kanthars of natron of forty-eight okahs each.*

The natron is stored at Terranéh, and is shipped from hence to Rosetta, thence to Alexandria, and from this port to Europe; or else it is sent up to Cairo and there disposed of for the use of the linen bleachers or the glass makers. It is reckoned to lose a tenth of its weight by waste and drying during the carriage.

The Fellâhs of the six villages of Terranéh pay their *myry* in cargoes of natron.

When from the presence of the Arabs, or any other impediment, the Fellâhs are prevented from fetching the natron, the duty is commuted for eleven parahs† upon each kanthar of this salt which they were required to furnish.

* Another species of natron is to be met with at Cairo, brought thither by the Gelab negroes from Arfour and Sennar, which is employed in the preparation of the Egyptian tobacco as a seasoning. Citizen Reynault has analyzed this salt, and finds that it contains a greater proportion of muriat of soda than the specimens which have already been mentioned.

The okah weighs 400 drahms or $2\frac{1}{2}$ French pounds, equal to 2 pounds 5 ounces 1-20th of an ounce English avoirdupois weight.

† Twenty sous of France (about ten English pence), are equivalent to twenty-eight parahs.

The

The natron is sold in Egypt for one patah of ninety parahs for the kanthar of thirty-six okahs, the buyer paying the carriage by water. The collector who farms this duty furnishes powder and ball for the caravan, and pays the escort consisting of sixty armed men, called *basciat*, who all receive equal wages.

The farming of the natron was precisely a *gabelle*. The villages that possessed manufactories that used this article were obliged to purchase, annually, a certain quantity of this salt from the principal agent.

The difficulty of penetrating into the natron valley stood much in the way of any opportunity of observing the lakes, so that they were not examined with any kind of regularity. The borders of the several lakes are covered, as we have already mentioned, with crystalline masses of salt, which, however, are not touched, though they might yield a great profit, as they are in immense quantity. At present there is only the lake (No. 4.) which is worked. The men go naked in the water, and break or tear off the lumps of natron with a sort of round iron mattock of sixty pounds weight, with a head blunt on one side and coming to a sharp point on the other. They take no pains, however, to collect

only

only the surface of the mass which might be gathered with much more ease than the other part. It makes an odd spectacle to see these black or tawny Egyptians coming out of the water quite powdered with the salt.

TRADE OF THE NATRON.

To establish this article of commerce on a right footing would require a proper analysis of the salt, which the inhabitants are not equal to; and a degree of activity and attention which is not practised in a country where the honest gains of industry are exposed to be a prey to the rapacity of the governors. The natron has been suffered to remain adulterated with different salts, especially sea salt, whence arose an increase of weight which enhanced the price of carriage. On the other hand, the manufacturers of Marseilles complained of the serious losses which they experienced in the wear of the vessels in which this impure natron was boiled. They began to look toward the soda of Alicant, and Egypt was about to lose this market in Europe, when the war broke out and rendered all foreign communication more difficult.

It was in the years 1788, 89, and 90 that the merchants of Marseilles, giving unbounded scope to

to a new speculation, imported into France a vast quantity of natron, a part of which still remains in their warehouses.

The export trade of this article from Egypt to foreign countries has been confined to Venice, France, and England. The demand for France and England was nearly the same. Venice only took a fifth part of the quantity consumed by the other countries.

Citizen Reynault is at present employed on a very important object to this article, that of separating in the great way the soda contained in the natron, so as to be able to offer it for sale in a state of perfect purity; which will add but little to the general cost of working this salt, and double the value of the product. In certain kinds of natron the sea salt is found lying between two horizontal beds of soda, and here, therefore, it may be separated by mere mechanical means.

The trade of Egypt in natron when a colony of France will, therefore, depend essentially on these two considerations: first, in a free and unmolested working of the salt lakes, which will be obtained by proper escorts and military posts, such as restoring that of Kaffr, and the coptic convents, by which means the Arabs will be better known, and therefore less dreaded; and secondly,

secondly, by a proper selection and purification of the natron, establishments for which should be made in the nearest inhabited places, and the lakes, such as at Kassr or Terranéh.

NATURAL PRODUCTION S IN THE SALT
VALLEY.

On the banks of the natron lakes grow a great abundance of flat stemmed reeds, and other productions of the vegetable kingdom, and the vivid green of these plants forms a striking contrast with the dazzling white of the masses of salt, and the grey dusky gravel of the desert.

Near the lakes are found the following plants: the *arundo maxima*, Fors. the *flatice aphilla*, Fors. the *tamariscus gallica*, Fors. the *artemisia maxima*, Linn. the *juncus spinosus*, Linn. and the *typha latifolia*, Linn. This European plant, which grows in ponds in France, is one of the most plentiful of all those on the banks of the natron lakes. There is also found the *lithospermum angustifolium*, Linn. the *zygophyllum album*, Linn. the *fagonia scabra*, Fors. and the *sueda vera*, Fors. a species of soda so called from the Arabian name *souked*. A few stunted palm trees may be seen forming thick bushes, but which bear no fruit.

We

We also meet with twenty or thirty palm trees beyond the last of the lakes, lying in a confused heap out of the ground, as if they had been torn up by the roots by some violent convulsion of the earth.

As to animals, we found but few of them. Among the insects we remarked the *pirnelia muricata*, the *carabus variegatus*, the common ant, a large kind of winged ant, and a species of moskitto, the bite of which occasions considerable swelling. Among the testacea we found one of the smaller snails. The quadrupeds that we noted were cameleons and the gazelles: these last may be traced by the mark of their small cloven feet which they leave on the sand. Among the birds we remarked the water hen, the duck, and the teal; these birds are in vast numbers, especially in the farthest lake, which is the least frequented.

No traces of ancient monuments are to be found in the valley of the natron lakes. We only saw below the fourth lake the site of a glass house, which we made out by the remains of the furnace, bricks, and fragments of scoria of glass in different states. The spot was certainly well situated for an abundant supply of the two materials for glass, vitrifiable sand and soda; and perhaps

perhaps at that time wood was not so scarce in the valley as it is at present. We cannot fix the date of this establishment. A small medal or piece of coin which we picked up might have given us some information on this head, but it was so eaten up by rust that we could make out nothing from it.

SECT. II.

TOPOGRAPHY OF THE DRY RIVER.

THE valley of this river lies to the west of that of the natron lakes, they are contiguous, and only separated by a chalk bed. It takes an hour and a half to travel from the convent to the adjoining valley.

The valley of the river without water is blocked up with sand beds, and its extent in length from one end to the other is nearly three leagues: It requires forty minutes to descend by a regular slope into the heart of the valley above the sands. This valley is barren, and appears to contain no springs. We found much petrified wood, some of it entire trees eighteen paces in length. The timber of the trees, and the fragments scattered about, did not appear to have been

been put to any use*. The greater number of these pieces of wood appear agatized, others seemed to be less advanced in their crystallization, and at this period they are enveloped with a very thick hard crust, whilst that which formed the substance of the wood drops off in scales. We likewise found in this basin the vertebræ of a large fish, which appeared to be mineralized, and what makes this opinion probable, we shall find further on, that water did flow through the valley, and contained living animals.

Besides the petrified wood there is to be found, chiefly on the slopes of the valley, round masses of quartz, which must certainly come from a great distance, silex and siliceous stones, gypsum, quartzeous crystallizations formed in cavities of stones, some kinds of geode, rounded fragments

* Father Sicard, in his *Lettres Edifiantes*, assures the reader, that in the valley of the river without water are found entire masts and wrecks of ships petrified. We saw nothing of the kind where we were, which indeed was only in a part of the valley.

Granger, in his travels in Egypt, asserts, that what is generally taken for petrified wood is not so in fact. The specimens which we brought back with us have so much of the character of petrified wood, that they appeared as such even to unpractised eyes; and good naturalists who have examined them are of the same opinion.

of jasper, fragments of rock containing green petrosibe, those jaspers called Egyptian pebbles, &c. The greater part of these belong to the primitive mountains of Upper Egypt; they therefore must have been brought hither by the waters of the Nile. Hence there must formerly have been a communication between the Nile and the Bahhar-bela-me, and consequently between these two vallies. There is besides no reason why this communication should no longer exist, and we shall make out the probability of this from other considerations.

The direction of the valley of the dry river is the same as that of the natron lakes. The general opinion is, that in tracing up these vallies you arrive at Faïoum, and in following their course downwards, you leave the province of Maryouth on the right *. This is the way which the wandering

* Maryouth is four leagues west of Alexandria, near the sea coast. A detachment of light troops on dromedaries may reach this town in two hours and a half. There are found here three deep wells well kept up and supplied by rain water. Some ruins are found in the neighbourhood, and tombs of the Arabs adorned with amulets. (There are verses of the Koran written on little slips of leather hung by threads around the tombs.) The territory of Maryouth joins the hills that terminate the chain of Lybian mountains.

dering Arabs generally follow when they make their incursions into Upper Egypt.

From the direction of these vallies it is to be presumed that their origin is at the spot where the lake Mœris is laid down, and their extremity at the Arabian Gulph.

The magnitude of the valley of the dry river, its direction, and the accounts which historians give of the lake Mœris*, would lead us to believe that this reservoir was only the head of this valley

mountains. The ground is covered with an alluvial soil like that of Egypt; and hence it has derived its origin from the waters of the Nile, which formerly must have flowed over this spot. During the rains some herbage springs up, and it is then visited by the Arabs, chiefly the Djeouabys, and their flocks and herds. The wells being only kept up by the rains, fill very slowly in dry weather.

Maryouth is frequented by the Arabs on account of its neighbourhood to Alexandria, and because this spot is the last of the chain of wells that border the desert ascending to the province of Bahyreh. This chain passes through Zarufit Ellauche, Derehé, Cabr-el-mara; Ellahouie, &c. and joins to the natron lakes by Ellauche. By travelling along the raised flat which separates the two vallies, a day's journey will bring you from Ellauche to the northern extremity of the lakes close to two adjoining hillocks, which are called the Two Paps.

* The survey of this country, which circumstances would not permit us to make, would be the true key to the geology of Egypt.

which had been dammed up by the sands either naturally or by manual labour, so that this lake was probably only formed and not dug out. This opinion is the more probable, as an inspection of the topography of the country will make it obvious that a reservoir dug below the level of the soil of Egypt would render its supply of water useless to the soil; and we have already shewn that this water thus retained would be more disposed to flow towards Bahhar-bela-me than within the interior of the valley of the Nile. To render such a reservoir useful to the lower part of Egypt, it would, on the contrary, be necessary for the lake to be formed by dykes, so as to keep above the natural soil, that after the inundation it might overlook the soil of Egypt. The existence of the lake Mœris therefore, and the object usually attributed to it, becomes very dubious, and will perhaps always remain problematical.

If we might hazard an opinion it would be that the earliest and gradual opening of the bosom of the Nile in Fäïoum are only owing to the opening of Bahhar-bela-me, which takes an oblique direction. Father Sicard, and after him D'Anville, lay down the channel of this ancient branch in the direction of the lake Mœris, but leave uncertain their point of contact. Besides, they

they make the dimensions of this lake much too large when compared to the extent of Bahhar-bela-me. If the opinion which we have given be said to be only a conjecture, it appears at least to be a fair inference, from the knowledge which we have actually obtained, that there have existed large channels of rivers in the interior of the deserts, and that it is highly probable that the Nile separated into several branches as high up as the lake Moeris; and especially that a branch, as we observed before, flowed within the basin along the hills of Lybia, as is confirmed by the testimony of authors, and by the remains of a considerable hollow or depression which follows the direction of the hills, and would only have been produced by a large current of water. This hollow I found again, and traced it along the whole extent of the province of Djyzreh for the space of thirty leagues. Higher up its course it seems to incline more forward, perhaps as far as the origin of the canal of Yousef, that is to say, to that point where it is probable that the Nile has been turned in order to be carried along the right bank, at the bottom of which valley flow the waters of the Bahhar Yousef*.

* This canal, which in the province of Djyzreh bears at first the name of El-lebene, then Elaffera, resumes in the

Thus from the testimony of geology, which is imprinted on the soil of Egypt, it appears :

1st. That the Nile, or more probably only a part of the waters of this river, flowed in the interior of the deserts of Lybia along the vallies of the natron lakes and the dry river.

2d. That the waters were turned aside in the actual valley of the river ; and this perhaps is the occasion why, in the time of Herodotus, the waters during the inundation rose to fifteen cubits, whilst in the time of Maris they only reached eight cubits, and why in our time they only rise as high as eighteen cubits.

3d. That the Nile after this change flowed entire along the hills of Lybia, and formed the hollow which is seen in Lower Egypt and part of Middle Egypt.

4th. That the Nile was thrown back upon the right shore, and this period immediately preceded the regular disposition of the seven branches of the Nile and the formation of the Delta. (See the memoir concerning the lake Menzaléh).

5th. The geological testimonies which bear proof to the preceding facts likewise confirm

province of Bahyreh the appellation of Bahhar-Yousef, the same that it bears in Upper Egypt.

What.

what we have said in the same memoir, that the waters of the Nile have a tendency to bear to the west, which bearing is marked in Egypt, as it would be for any point in other countries, by the general topography of the soil.

It follows from this last circumstance that the project of Albuquerque to ruin the fertility of Egypt, by turning the course of the Nile, would be more practicable by making a canal from this river into the deserts of Lybia than into the Red Sea, as was intended.

The valley of the dry river is not the furthest point of the interior of Africa that is visited in this direction. The inhabitants of Terranéh go beyond this valley to cut a particular sort of rushes which are used in making the finest mats. The Djcouaby Arabs are employed in carrying these rushes to Menouf*, where they are sold.

In

* Menouf is situated on the Delta, near Terranéh, two leagues from the branch of the Delta, and four from that of Damietta, on the eastern side of the canal of Faraounyeh, which crosses obliquely the south part of the Delta. This canal on the side of Damietta is closed by the dyke of Faraouyneh.

It is by means of this dyke and canal that an enlightened administration might effect a just partition of water between the eastern and western provinces of the Delta. Thus

In order to reach the place beyond the valley of the dry river, where these rushes are procured, it is necessary to make three long day's journeys across a tract entirely destitute of water.

PROGRESS OF THE SANDS.

It has been already mentioned that the valley of the dry river was much encumbered with sand, which, as well as what is found in the valley of the Nile, appears to have been brought hither by the violent winds which blow over the elevated plains situated to the westward. The valley of natron and that of the dry river being separated from each other by a mere ridge, the former has been scarcely at all incommoded by the shifting fands, although its eastern boundary is the high desert that lies between this valley and the Nile. This clearly proves the progress of the fands to be from west to east, and their actual advance in this direction for many years has induced very serious apprehensions on ac-

count
might the disorders of the former tyranny be in some degree repaired, which, by favouring the provinces of Mansoureh and Damietta at the expence of Bahyreh, have reduced this last for want of water, in great measure into a mere desert.

count

count of the left bank of the river, which is by far the most fertile part of Egypt.

Not to wander beyond the limits of the map, we may begin by observing that the sand hills on which Beniselamé is situated, and which enclose Atris and Ouardan, are drifted up by the west winds from the deserts of Lybia. The alluvial soil formed from the depositions of the Nile serves them for a base, which accounts for the beautiful sycamores previously rooted in this soil, which are found dispersed through the whole of these arid downs. The sands here and in other parts are blown on the bank of the Nile, just as the ashes from Vesuvius are on the sea shore; the road by the river side is obstructed by them to such a degree, as to induce most travellers at present to desert it. The above facts, and those mentioned in the memoir concerning the lake Menzaléh, lead to the following considerations.

There seem to be three causes which, by their union for many years, have impaired the prosperity and contracted the fertile territory of Egypt. A turbulent administration, active only in mischief; the diminished action of the Nile, in consequence of neglect, which has again yielded to the encroachments of the sea much of the newly formed land of Lower Egypt; and the unintermittent action of

the wind, which has driven the sand from the western deserts on the cultivable land, and into the river and canals. The two first causes may in part, at least, be removed, but no human effort can raise a barrier to the progress of the sands. In this deficiency of natural means, ignorance and credulity have invoked the aid of superstition; and accordingly we read in the Arabian authors,* that the sphinx near the great pyramids is a talisman to arrest the progress of the sands of Lybia, and prevent them from entering the province of Djyzeh.

From what has been mentioned before, however, it seems probable that this invasion by the Lybian sands is near its termination, at least in Lower Egypt; and, in fact, there are few moving sands on the plain to the west of the Nile.

This plain is calcareous rock, whereas almost the whole of the sand in the valley of the Nile is quartz: for the future, therefore, no sand can be drifted from this tract except such as proceeds from the decomposition of the calcareous rock. The sands from the interior of Africa, in their progress towards the Nile, are effectually stopped by the valley of the dry river, which includes

* See the geography of Abdul-thachyd, who wrote about the year 1403.

the provinces of Djyzeh, and Bahyreh. It is true this valley is already much encumbered, but many years must elapse before it is quite filled up; and even when this event takes place, the valley of the natron lakes opposes a barrier, which must be in the same manner overcome, before any sand can reach the plain west of the Nile.

The action of the winds on the sands which are in the valley of the Nile itself, is, without question, the most formidable. These are in almost perpetual motion, and by degrees will probably reach to the very brink of the river, as is already the case in the narrowest parts of the valley. The river too, accelerates the evil by the constant wearing away of the western bank, thus of itself approaching the sands, and at the same time eroding the most fertile part of Egypt.

SECT. III.

CONCERNING THE COPTIC MONASTERIES.

THE Coptic monks were established in the valley of natron in the fourth century; but the monasteries themselves have been several times rebuilt since that period. Three of these are in the

the form of a long square, the dimensions of which are from 98 to 142 metres in one direction, and from 58 to 68 metres in the other, giving a medium surface of about 7560 square metres.

The walls by which they are surrounded are, at least, thirteen metres in height, and from two and a half to three metres thick at the base. In the upper part of the wall is a platform about a metre in breadth, above which are loop holes in the wall itself, and small bastions to enable the inhabitants to keep off the Arabs by throwing stones, for the institutions of these monks do not allow them to make use of fire-arms. The bastions are masked to protect the garrison from musketry.

The monasteries have only a single entrance, which is low and narrow, not exceeding one metre in height, and two-thirds of a metre in width. This is closed by a very thick door, fastened by a lock at the top, by a strong wooden bolt about the middle, and a little lower, by a bar bedded in the wall. The door is further strengthened, on the inside, by a covering of broad iron plates. On the outside the entrance is, as it were, hermetically sealed by two blocks of granite, placed upright, and by the side of each other,

other. The diameter of these blocks is rather less than the height of the entrance, and their thickness such as to allow them to lie side by side within the door posts. The door is also defended by a kind of portcullis. When they want to close up the entrance, a monk begins by rolling one of the blocks of stone into its place, he then slides into the gateway, and pulls towards him the other block, and places it by the side of the first; this kind of outwork being thus arranged, he closes the door. The use of the portcullis is to expose any who may attempt to remove the stones.

The bell of the monastery is fixed by the side of the portcullis. A long rope made of the filaments of the date tree, hangs from it almost to the ground. It sometimes happens that the monks are roused, during the night, by the sound of the bell; but always distrusting, even when they recognize, from the top of the wall, their friends below, they never open the door to them, till a monk, descending by means of a rope to the portcullis, examines them face to face, and is convinced that no surprise is intended. While the door is opening a monk remains sentinel on the top of the wall, to observe whether any Arabs appear in sight.

Within

Within each monastery is a square tower, accessible only by a drawbridge five metres long, and about six and a half above the surface of the ground. This bridge is raised by means of a cord or chain, which passes through the wall, and is wound round a horizontal windlass within the tower. The top is a platform higher than the boundary wall.

The three monasteries in the neighbourhood of the lakes have wells thirteen metres deep, containing about one metre of fresh water, which is raised by a wheel and bucket. These wells supply the wants of the monks, and are sufficient to water a little garden in each monastery, in which are cultivated a few legumes; and where grow the date tree, the olive, the tamarind, the henné, and the sycamore. By the beginning of Pluviose the water of the wells is at its *maximum* of elevation; it sinks in summer, but the springs are never entirely dry. The monastery of the Syrians possesses the miraculous tree of St. Ephrem,* which is about six metres and a half high,

* It is related that in the early age of monastic fervor, the monks of the desert, already disgusted with their situation, complained of the total want of vegetation in their sandy solitude. St. Ephrem, to prove and enliven their zeal, ordered one of his proselytes to plant his staff in the sand, assuring

high, and three in girth: it is an Indian tamarind, (*tamarindus indica*, Linn.) of which these monks think themselves the sole possessors. The tree is, indeed, very rare in Lower Egypt, but is common enough in the Said.

The fourth monastery, which bears the name of St. Macaire, has only one well, and the water of this is salt: but at the distance of four hundred metres there is a copious well of fresh water,* as well as a spring on the opposite side of the valley. The other two monasteries have also a similar spring in their vicinity.

The cells of the monks are recesses into which the sun never penetrates, but by the door, which is a little more than a metre in height. The whole stock of furniture, and utensils of each, consists of a mat, a jug, and a kolleh.† The

suring him that it would become a tree. After some persuasion the young monk obeyed. A miracle took place, the staff shot out roots and branches, and became a tree, which ever since has been called St. Ephrem's tree, or the tree of obedience.

* The depth of this well is five metres, its square dimensions about one metre and a third, and there is about one metre in depth of water.

† The kolleh, or bardak as it is more usually called, is a large jar, made of slightly baked clay to hold water in, which is kept cool by exposing the vessel to a current of air.

chapels decorated with images coarsely painted, are kept tolerably neat, but beyond their precincts every thing is in disorder, dirty, and disgusting. The poverty of these monks not allowing them to decorate their chapels with any costly ornaments, does not, however, deter them from procuring the best substitutes that they are able; thus, instead of silver lamps, they make use of ostridges eggs, which have a very pleasing effect.

Several of these monks are blind, and all of them have a haggard, melancholy, and restless air. Their revenues being extremely small, their chief subsistence is on alms. They live on beans and lentils prepared with oil: their time is passed in prayer, and even amidst this sea of sand the smoke of incense arises, and the cross surmounts the highest pinnacles. In the monastery of the Greeks are nine monks, eighteen in that of the Syrians, twelve in that of Amba-bicoi, and twenty in the fourth; all of whom are subject to the jurisdiction of the patriarch of Cairo.

We are unacquainted with the amusements of these pious Cenobites, we perceived no indication of cultivation of mind or of manual occupation. Their whole library consists of some Ascetic manuscripts on parchment or cotton paper, some in Arabic and the rest in Coptic, with an Arabic translation: we brought back with us some

some of these last which seemed to be about 600 years old. The monks appeared to be flattered with our visit, and our minute inspection of the interior of their dwellings, and before our departure they offered to us, and we accepted the bread of the communion*.

A kind of forced hospitality is exercised by these monks towards the Arabs; nevertheless so suspicious are they of their guests as never to travel from one monastery to another except by night. The wandering tribes in their journeys through the valley stop under the walls of the monasteries for refreshments for themselves and their horses: these the monks lower from the top of the wall, for they never open the door in the presence of an Arab. By means of a bag attached to a rope, they let down from one of the angles of the boundary wall some bread legumes and barley. They think it prudent to pay this tribute for fear of being robbed and assassinated if met with beyond their walls. Thus oppressed and exposed to perpetual alarms, it is not surprising that they bear with impatience the dominant

* The communion-bread, made of unleavened paste, is in the form of round cakes, about the size of the palm of the hand, and a finger's breadth in thickness, and covered with Arabic characters.

religion ; such is the fatal effect of religious prejudices and religious differences, that even in these holy retreats we were piously asked *when we intended to massacre all the Mussulmans?* Nor was this the first time since our arrival in Egypt that we heard similar enquiries.

Such, however, is the combined influence of interest and superstition, as occasionally to bring together these natural enemies. It is customary in some of the provinces when a Mussulman is about to establish a dove-house, for him to send an express to the monasteries of the desert with the usual present: the good monks courteously receive the gift, and send back in return a mysterious letter which, according to the common faith, if laid in the dove-house, will render the colony strong and populous.

OF THE DJEOUABY ARABS AND THE BEDOUINS.

The banks of the Natron lakes are frequented every year by the Djeouabys*, a hospitable tribe who lead a shepherd's life, and encamp there

* The Djeouabys have for their leaders Karamit-abou-ghaleb, chief sheik of the tribe, Hhadjy-thahh-aloudihil and Hhadjy-ica-abou-ali. This tribe is composed of about two thousand men, and possesses about fifty horses.

every

every winter with their flocks. They are employed during this time in carrying natron and prickly reeds; they also have some traffic in dates which they fetch in caravans from Sioua in the Ammonian Oasis: it is a journey of twelve to fifteen days. These Arabs are *marabout*s or peaceful people, * who wander here and there to find water and pasture for their cattle. This tribe has more than any other, preserved their ancient customs; they are merely shepherds, and refuse to cultivate the soil. Their manners are mild, and partake of the simplicity of their way of life. They are not however exempted from the turbulence of the passions, and especially that of love, which in every country, and especially in the East, is closely allied to jealousy, and this sometimes hurries them into the most cruel excesses†.

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* They never make war, and only take up arms to defend themselves, and even this but rarely; they almost always trade for money.

† Haoud a respectable old man, head of a large family, and a dependent on Bhadjy Taha, had his only son assassinated in the arms of his wife. She had had a former husband who repudiated her on frivolous pretences, but filled with love and rage, this atrocious wretch swore that he would kill with his own hand every one who should marry her, and he kept his word. Haoud not being able

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The cloathing of the Djeouabys consists of an *ihhram* and a *bernous*, a kind of cloak similar to the surplice which is worn by those that officiate in the Romish church: it is made of white wool. This stuff which is used to clothe both men and women is manufactured in Barbary: it is bought at Cairo, but chiefly at Alexandria. The women spin the wool from their own sheep to make the cloth used for their tents, and other common purposes.

The wealth of the Djeouabys, and in general of the Arabs of the desert, consists in camels and sheep, whilst that of the Arabs who inhabit the villages is in large cattle, for these last have but few camels. Who would imagine that in the midst of deserts a state of easy circumstances establishes the same distinctions as with civilized people, and turns aside natural propensities? The Arabian women do not all fickle their own children, the more opulent employ wet nurses.

to bear the fight of the murderer of his own son, had retired to Upper Egypt, and, without wishing it, he had drawn with him several families. This unfortunate father perceiving that his retirement occasioned disorder in the tribe, has rather chosen to suppress his resentment than injure the common interest, and has returned to Bhadjy Taha. But he appears always melancholy, his eyes filled with tears, and he drags out a languishing existence.

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Those mothers who do not abandon their children to hired nurses appear equally susceptible of the same feelings towards this tender age as the more civilized people. At the attack of an Arabian camp which was surprized by some of our troops, the men took to their horses and fled with precipitation towards the Nile, abandoning the women to their fate. These, whether by the impulse of the moment, or from reflection, thought to protect themselves from the fury of the soldiers, and retard their progress, by laying their children at the feet of their pursuers. This, however, did not stop our brave men; for in the midst of pursuit they lifted from the ground these little innocents, gave them into the arms of their mothers, and continued as before to follow their enemies.

It is very difficult to prevent disorder from reigning in a camp taken by assault. In these cases the Arab women, under the apprehension of submitting to the desires of the conquerors, have been known to have recourse to a singular stratagem in order to inspire disgust, that of besmearing over their faces with cow-dung.

The Arabs of the desert bear the name of 'Khaiah Arabs, or inhabitants of tents, *khaiah*, meaning canvas. The village Arabs are called

Khaith, or dwellers within walls. These last were once wandering tribes who gradually approaching a more cultivated country, at first dwelt in tents, but insensibly changed them for settled habitations like the fellahs of Egypt.

There is no kind of convention which binds the members of any tribe to the chief; he is almost always of an ancient family, and respected as such; but to maintain his authority as the head of the tribe, he must employ persuasion, address, accommodating manners, in a word, all the art of an experienced leader; he has, however, the right of making peace or war, and is charged with what concerns the general welfare of the tribe.

As soon as peace is made with a tribe, or a treaty commenced, the chief is invested with a cloak, or pelisse; and this custom of making presents is so fully established, that the contract would not be thought binding without this distinction.

The Arab sheiks negotiate with a sort of dignity, or rather reserve, like all other knaves. What has been called *eating bread and salt* with their new friends, and which has been thought so sacred a pledge, is, in fact, a mere farce, consecrated by custom. The Arabs on each

each bank of the Nile have shewn that they pay no regard to the sacredness of an oath: they violate their own treaties whenever fear or interest impels them to it.

When the Arabs present themselves before a person whom they respect, they leave their horses at about a hundred paces distance, and then advance on foot.

They know no other laws than that of retaliation. Where there are no penal laws, nor magistrates to put them in execution, murder would go unpunished, if assassination did not in some degree supply the want of public energy. Hence it is that this, which with us is looked upon as a base crime, becomes a legitimate act of vengeance, which is pursued by the relations of the sufferer from generation to generation.

These murders constantly foment warfare between different tribes, or between the wandering tribes and the villages. It is then called *having blood between them*.

Sometimes, to *ransom the blood* and to restore peace, a payment is made as a compromise; but this is accounted shameful, and thus the weak, or pusillanimous, become doubly tributary to the stronger.

The villages that refuse to pay, are liable to be

pillaged three times. These plunders strike the country with terror, and make the inhabitants regard the Arabs as some of the most formidable scourges with which they are afflicted. I asked a sheik if he had had the plague this year in his village? "We have had," said he, "the plague and the Arabs."

The Arabians, like all the inhabitants of the East, are much addicted to pæderasty. The Arabs say five prayers in the day: they eat in the forenoon, and again before the fifth prayer, or at the end of twilight. Two inhabitants of the villages will consume as much food as ten Arabs. These make but little bread—to grind their corn they use hand-mills, furnished with small grindstones. They eat dates, drink little water, and camel's milk in preference, and sleep about six hours. Flesh meat is a rarity to them. They make no sumptuous entertainments; a roasted sheep set on table entire, all but the head, which is cut off, is the principal dish, and that is served up whenever a sheik is of the party.

The Arabs only measure their day by the stated times for prayers. They measure time by the length of their shadow: the shadow is measured with their naked feet, which they place alternately one before the other. Their rules for estimating

estimating are: That in the summer solstice, mid-day is one foot from the vertical point; that in winter, at the same hour, the shadow is nine feet in length; that in summer the shadow which answers to the middle point of the interval from noon to sunset is seven feet beyond the place of the shadow at noon.—These measurements are exactly conformable to the latitude of the country.

These people, ignorant and credulous, are persuaded that the treatment of a fever, and other diseases, consists in placing under the head of the sick man a slip of paper containing some mystic words, written by a dervise; and the patient lies down full of confidence in this receipt, and still more in Providence.

The women, when arrived at the full term of their pregnancy, find what assistance they require in delivery, among persons of their own sex, who make it their profession. I was assured, that if the unmarried women or widows become pregnant, they are killed by the irrelations, unless they destroy themselves.

The Arabs have a great dread of the small-pox and the plague: those who have not had these diseases take great pains to avoid those that are

suffering under them. The small-pox leaves very considerable pitting in their faces. Notwithstanding the prejudices of religion, the bodies of those dead of the plague are burnt with the greatest care.

The ages of their children are dated from certain events or periods: thus those born this year will date from the entry of the French into Egypt. The Arabs have a kind of chronicle which comprehends about ten years. They have no public registers. The date of the birth of their children is written on a slip of paper over a page of the Koran, and that of the children of the village on the gates or walls of the houses.

The want of surgical instruments gives rise to a very singular custom in gun-shot wounds, the intention of which (however fulfilled) is to supply the place of forceps to extract the ball when it has only made a flesh-wound. This custom is to make an incision in the hinder parts of a frog, of a corresponding size with the lips of the wound, and unite the whole with a good ligature. They pretend that this process, and the convulsive movement of the dying animal, draws to the surface the ball that made the wound. They then dress the wound with oil or butter, and

and burn it with verdigrise, to hinder it from closing too soon. It is for the same purpose, and in order to promote suppuration, that they put in the wound a small stone, which is the same with the cautery which is employed in Europe.

The Arabs always carry with them that which makes the greater part of their riches, and with which they provision their dwelling camps. They preserve their chopped straw and their grain in large pits dug under ground. The neighbourhood of a well of fresh water, a few slips of land of a scanty product, or salt lakes that can be worked with some profit, determine the site of these encampments. The Arabs possess besides, at four or five leagues from the margin of cultivated countries, store-houses kept fast closed, and further on in the desert deposits under the sand known by some outward marks to the proprietors only.

The Djecouabys, in order to escape being pillaged by the wandering tribes, are obliged to receive them into their camps, and furnish them with provisions, and barley for their horses. The Arabs of the desert are a lawless predatory race, and had been in a state of constant warfare with the Mamelukes, who, however, kept them in some kind of awe. On the first arrival of the

French

French the women of the Hennadys* chanted

Success to the people who have driven Monrad from Cairo.
Success to the people who have brought us into the villages.
Success to the people who have fed us with *fourthyer* †.

Since, however, we have repressed their incursions by vigorous measures, they have ceased to celebrate our arrival. The same distrust ought to be entertained of these Arabs as of robbers and assassins : they are but little formidable as a military force, except where they experience no opposition ; and the expeditions of the French in pursuit of them penetrating into the centre of their arid sands and their deserts, which were esteemed inaccessible, will, no doubt, be attended with the happiest effects.

The principal weapon of the Arabs is a pike*,

* Monsa-Abu-Ali is the chief of the principal tribe of Hennadys. They possess about three or four hundred horses, and with their allies can muster from 900 to 1000 cavalry. The Hennadys are the most ancient of the Libyan tribes that are known in Egypt.

† A kind of cake spread over with butter, which is eaten with honey, or more commonly with molasses.

‡ The pike consists of a squared iron head, terminated by a sharp point, and fixed to a pole from four to five metres long. The wounds made by this weapon are not so deep as those of the lance, the head of which is compressed ; but their consequences are generally more serious, not unfrequently

which they wield, and throw with great dexterity. They manage their horses with equal skill, and pay the greatest attention to them ; nevertheless, one of their practices appears to an European, at least, very injudicious ; it is that of checking the horse on full speed, and making him rear on his hind legs. The Arabs never attack in line, but always like foragers, uttering at the same time loud cries and invectives ; their style of fighting being merely that of light troops.

The horses of the Arabs are very swift, and they push them to their full speed ; at the same time, and without letting go the reins, which they hold in their left hand, they charge an enemy in front. If successful they strip him, and sometimes cut off his head, which they bear in triumph at the end of their pike. When they miss their blow they return to the charge by a half wheel to right or left, or endeavour to gain the 'vantage ground.

The Arabs are in general but ill equipped. Their fire-arms and powder are very bad ; their balls are not well cast ; the powder is granulated

quently terminating in locked jaw. The Arabs east of the Nile have, almost all of them, pikes or lances ; but those of Lybia carry fire-arms.

in

in an inartificial manner, and is for the most part charcoal ; they carry it in a wooden flask, and the balls separately in a leathern bag, seldom charging their pieces with cartouches.

The Arabs bordering on Egypt were in the habit of sending spies to Boulak, disguised as husbandmen, in order to learn the kind and number of the troops about to march against them from Cairo. As soon as their spies returned, the tribe broke up camp, and sent far into the desert their wives and children, and all their valuables. The men themselves made a few days march to fatigue their enemies, and in the mean time, being joined by the confederate tribes, they either commenced hostilities or received the attack.

Every camp has advanced guards on the neighbouring heights, who carry their turbans on the point of their lances. If the camp is to advance, the vedettes march on the same side as the enemy, or the prey which they propose to carry off ; if the contrary, the vedettes return towards the camp.

As soon as the Arabs are apprehensive of an attack, they separate into several small camps at a great distance from each other, and tie their camels

camels to the tents so as to be able to move off at a moment's notice.

When one tribe is engaged with another, the women come within sight of the combatants, playing on the tambourine, and singing strains powerful to excite their courage: the wounded are taken care of by their wives or mistresses. The women hold valor in great estimation, and a chief covered with scars is the boast of the whole tribe; thus the support of empires is the band of union among these miserable hordes of robbers.

A combat in which twenty or twenty-five men are killed, is reckoned a bloody battle, the date of which forms an important era.

It is necessary when marching during night in the desert, against the Arabs, to be aware of a circumstance, which would otherwise, often give a needless alarm of the presence of the enemy; this is the light of the horizontal stars, which here, as well as at sea, are very apt to be mistaken for fires.

The natural encrease of mankind imposes on them the necessity of seeking for subsistence; hence the forty thousand Arabs that border upon Egypt, finding no resource in their arid sands, consider this country as their own domain, and under

under this pretext, are perpetually making predatory incursions. The government has often ineffectually, and never with more than partial success, endeavoured to repress this mischief: in the mean time the unhappy cultivator was exposed to the vexatious oppression of the agents of government, and the devastation and cruelty of the Arabs. Such was the condition of the inhabitants of Egypt; it is greatly to be wished that it may be henceforth ameliorated.

*Itinerary of the Expedition to the Natron Lakes
and the Dry River.*

Estimated or measured Distances.	Metres.	Hours.	OBSERVATIONS.
From Terranéh to Kassr		12	According to the rate of the caravans.
From Kassr to lake No. 3	628		
From Kassr to the South extremity of the lakes		1 $\frac{1}{2}$	
From Kassr to the North extremity		4	
From Kassr to the monastery El-Baramous	7,231		
From Kassr to the monastery of the Syrians	7,430		
From El-Baramous to the monastery of the Syrians	9,258		
From the monastery of the Syrians to that of Ambabicoi	444		
From the monastery of the Syrians to that of St. Macaire		3	By estimation.
From El-Baramous to the Dry River		1 $\frac{1}{2}$	Do.
From the monastery of the Syrians to the Dry River		1 $\frac{1}{2}$	Direct. N. and S.
From St. Macaire to the Dry River		1	By estimation.
From St. Macaire to Ouardan, through Beny-Selameh	11		

On the 5th, we reached the Northern extremity of the lakes; on the 6th, the Monastery El-Baramous; and on the 7th, we crossed the dry river.

Angles which certain Directions make with the Magnetic Meridian.

The direction from Kassr to the monastery El-Baramous	-	102°
From Kassr to the monastery of the Syrians	-	180
General direction of the lakes	-	44
The east front of the monastery of the Syrians	-	7
The entrance of St. Macaire, N. & S.	-	16
The entrances of the three other monasteries look towards the north,		

Observations on the Natron;
By Citizen BERTHOLLET.

THE valley of the natron lakes presents several objects worthy of particular attention. It is a vast laboratory, where nature prepares an immense quantity of soda, the use of which, under the name of natron, goes back to the earliest records of history, and for little more than the expence of collecting and carriage, the whole demand of the mother country may be supplied.

There are found in the six lakes already mentioned, salts that differ from each other even in parts of the same lake that have little communication with each other. These are in general muriat of soda, carbonat of soda, and a little sulphat of soda, but in various proportions, so that the carbonat of soda prevails in some, and the muriat in others.

The lake No. 3, which we particularly examined, is divided into two parts, the waters of which have scarcely any communication; the eastern part contains only common salt, and the western little else than carbonat of soda, so that we find on one side of the lake, by spontaneous evaporation marine salt, and on the other carbonat of soda, each almost pure.

During

During summer, the saturated water deposits saline crystals, and when it holds both muriat and carbonat of soda, the former crystallizes first, and then the carbonat of soda, so that there are formed alternate strata of the two salts, which increase every year, provided they are not disturbed.

The water of part of lake No. 3, and that of No. 4 is red, as is also the muriat of soda which is deposited: this colour is owing to some substance that is not mineral, but which burns, giving out ammoniacal vapours; when the same subsides on the carbonat of soda it becomes black.

The saline masses that crystallize in lake No. 4, or on its sides, are the most eagerly sought after by the caravans that bring the natron to Terranéh. The red colour which it has, gains it the name of Natron of the Sultan. We are informed that it is preferred in the Delta to any other for bleaching linen and thread. It is however, for the most part only common salt, and care should be taken not to export it to Europe for fear of discrediting the trade.

The six lakes are in part surrounded with reeds. The soil which separates them, and which forms the valley is in general covered with incrustations, composed principally of masses of

carbonat of soda of greater or less purity, but partly of muriat of soda. There are sandy spots that contain no salt, and others that are too wet and clayey to retain it. Some of the masses of carbonat of soda are more than three decimetres in thickness, and have acquired a hardness approaching to that of stone. Of such are built the walls of Kassr.

We collected indiscriminately specimens of the natron in different beds around the lakes, and submitted a determinate quantity of each to an assay. We dissolved them, filtered the solution, dried the earth remaining on the filter, saturated the alkali of the liquid, and compared the quantity of muriatic acid necessary for its saturation, with that required by an equal weight of carbonat of soda deprived of its water of crystallization. The results of these experiments are given in a tabular form drawn up with care by citizen Regnault.

It might be supposed that the soil of the valley of the natron lake would be equally impregnated with the soda and muriat of soda which effloresce or crystallizes on its surface. Several circumstances however that we have remarked seem to prove, that the carbonat of soda owes its origin to the decomposition of the marine salt.

In that part of the lake No. 3, which I have said only contains sea-salt, is found a circular island that is covered with natron: the fifth specimen, as marked in the table, was procured from thence. After having removed the crust of natron, the moist soil only contains nuriat of soda: the carbonat of soda therefore which is found there surrounded with water that only contains sea-salt, and upon a soil impregnated with sea-salt, must necessarily owe its origin to this salt.

In like manner, in several places that are covered with sea-salt, small spots, sometimes not more than a square decimeter in size, are found, upon which natron has deposited, formed in the midst of sea-salt.

The soil which is covered by layers or incrustations of natron, does not itself contain a sensible quantity of soda; but it is always found impregnated with sea-salt.

It appears therefore incontestable that the marine salt produces, by its decomposition, the carbonat of soda which is contained in the natron, in all those places where its deposition is not owing to the evaporation of water.

Let us now examine what are the circumstances which determine its decomposition.

If the soil is too argillaceous, no natron is found at the surface, but only sea-salt, or at least, it contains but very little carbonat of soda. If it is too siliceous, no salt at all is yielded, the rains having doubtless washed away every thing saline.

The soil in which this decomposition of sea-salt is taking place always contains a considerable portion of carbonat of lime, and has always been found in a moist state. It appears then certain, that it is the carbonat of lime which occasions the decomposition of the muriat of soda, with which it is made to come in contact by means of the heat and moisture. There is likewise found in every soil, whether clayey, chalky, or sandy, a small quantity of oxyd of iron, but which probably does not influence the formation of carbonat of soda.

Since the muriat of lime which results from the decomposition of the muriat of soda is very deliquescent, it must doubtless sink deep into the soil till it is itself decomposed by some substance that it may meet with.

In those places principally where the earth is too argillaceous, the production of the natron is singularly favoured by the stems of rushes, around which the carbonat of soda adheres as fast as it forms, and gradually climbs to the top of the stalk,

stalk, so that it is not uncommon to find a rush covered with a thick coating of natron, whilst the soil which surrounds it, contains only muriat of soda, mixed with a very small portion of carbonat of soda.

When the natron which covers any soil has been carried off, it requires, as we have been informed, four years for its reproduction, if the seasons have been moist, and six if they have been dry. It appears that the rains which fall in this part of Egypt, and which produce the beds of small torrents that are seen around the lakes, serve not only to keep up the due degree of moisture necessary for the decomposition of the sea-salt, but also bring with them this salt, whereby the land becomes impregnated and capable of decomposition: so, in a higher plain near the former Coptic convent, we found a great extent of ground covered with a thick crust of marine salt, and in several other parts of the desert, in the neighbourhood, similar crystallizations of salt have been met with. The rain torrents in their passage to the lakes carry with them not only the sea-salt, but the soda which may fall in their way, and hence, according to the course of the currents, we find the water in the lakes to con-

tain in particular parts, either sea-salt alone, or carbonat of soda alone, or these two salts in different proportions.

The general result of these observations is, that the circumstances which determine the formation of carbonat of soda are: 1st, A mixture of carbonat of lime and sea-salt; and 2dly, A pretty uniform moisture. The stalks of the reeds favour this production, by assisting the efflorescence of the carbonat of soda, and the heat of the climate doubtless contributes to this effect. It is on the consideration of these circumstances that I mean to ground the explanation of this production in a memoir which I shall soon present to the Institute*.

It will be seen by the table hereto annexed, that there are some samples of natron which contain much carbonat of soda, and therefore, may be looked upon as a very good soda, but that others are of a much inferior quality, so that in order to establish the use of this article in Europe

* I began the reading of this memoir, which is entitled, "An Enquiry into the Laws of Chemical Affinity", at the last sittings of the Institute of Egypt, at which I assisted. On my return to Paris, I presented it to the National Institute, where it has been read.

with confidence, it would be necessary to have an intelligent agent on the spot, to select the salt, and to fix different prices according to the goodness of the natron, which should be determined, not by accidental changes of colour, but actually ascertaining its contents in carbonat of soda. These works would then become an important branch of the revenues of Egypt.

What would be still more adviseable, is to purify the carbonat of soda on the very spot where it is worked, or at Terranéh, the place where the caravans unload and deposit their natron, so that it should be quite free from earth, contain but little sea-salt, and be manufactured in an uniform manner. Citizen Regnault has undertaken experiments to arrive at this desired end, by which he proposes to take advantage of the greater solubility of carbonat of soda, over muriat of soda, and the evaporation which may be produced by the heat of the sun.

TABLE of Assay of the different kinds of Natron performed by saturation with muriatic Acid.

Parts of muriatic acid
Contained of extraneous matter.

Parts	Parts of muriat. acid	Contained of extraneous matter.
100 Of carbonat of soda, crystallized, and serving for comparison with the other experiments required for saturation	140,6	
100 Of natron effloresced on the banks of the third lake	153,1	25 parts of sand and chalk mixed
100 Of natron indurated and employed like stone in building the walls of Kaffir	106,3	of sand and chalk.
100 Of natron found in the reeds in the neighbourhood of Kaffir	94,2	of sand, combustible or coaly matter, and chalk.
100 Of natron found near the furthest lake	89,6	of sand and chalk.
100 Of natron found on a rising, surrounded by sea salt near the lake, No. 3.	85,5	of chalk, sand, clay, and coal.
100 Of natron found near the first lake, and containing but little soda, requiring for saturation only	47,9	of sand and chalk.
100 Of natron of the kind called <i>sultani</i> , and which is found near the lake, No. 2. It contains no soda, but is only sea salt coloured with a vegeto-animal matter	15	o 8 of sand.

As this last species of natron lies between alternate layers of carbonat of soda and muriat of soda, there was great difference found in the analysis of different specimens.

Observations

Observations on the dyeing Properties of the Hhennê.

By Citizens DESCOTILS and BERTHOLLET.

The Hhennê is a shrub which grows in India, and is cultivated in Egypt, principally in the neighbourhood of Cairo. It is of the family of *Salicaria*: it was known to the ancients under the name of cypris, and was employed in dyeing the cloth with which the mummies were covered.

The leaves after being hastily dried are beaten into a paste, which is used to dye of a red orange the nails and palms of the hands.

The Hhennê when reduced to powder has an olive colour. By boiling with water it gives a very deep yellow orange liquor, highly loaded with colouring particles.

By long exposure to the air this decoction, if diluted with water, loses a part of its colouring matter, without, however, altering its shade, and brown pellicles form on the liquor.

The oxygenated marine acid destroys its colour, but it requires a large quantity to produce this effect.

Acid

Acids weaken the tint, alkalies render it deeper; but neither of them alter its transparency. Lime-water acts on the colour like the alkalies, but it makes the liquid turbid.

Muriat of soda produces no alteration.

Sulphat of alumine slowly produces a bright yellow deposit, less tending to orange than the natural colour.

Nitro-muriat often occasions more speedily a pale orange precipitate.

Sulphat of iron troubles the liquor and gives a black a little mixed with green; but no precipitate settles to the bottom. Nitrat of iron gives a black precipitate approaching to green.

A solution of glue produces no precipitate, shewing that the Hhenné contains no tan, and cannot therefore be employed in tanning hides.

We dyed with a decoction of Hhenné a strip of woollen cloth not previously prepared, another that had been alumed, and another that had been soaked in a nitro-muriat of tin, prepared with a mixture of nitric acid and muriat of ammoniac.

The first took a yellow colour approaching to orange.

The second a brown yellow.

The

The third a yellow much brighter, and with more orange in it than the first.

Other specimens took clearer colours when dyed with a decoction less loaded with colouring matter. By this means various gradations may be made to a very clear yellow with cloth not prepared, and as low as a grey a little mixed with green on alumed cloth.

By washing with soap, these dyed strips took a more orange tint and a little weaker, but on the whole very little colour was lost.

Stuff prepared with sulphat of iron took a brown, bordering on green. A little of this metallic salt added towards the end of the dying process gave somewhat of a coffee-brown, which appeared to us to be very good; by merely dipping the cloth, after it has come out of the dyevat, in a solution of sulphat of iron, it acquires a brown tint which adds considerably to its beauty.

Some of these specimens having been exposed to the sun for several days, appeared to have undergone no other change than having taken rather more of an orange shade. The alumed cloth, and that which had been prepared with sulphat of iron, had not experienced the slightest change. The colours also resisted the action of the

the oxymuriatic acid in the same manner as the most permanent dyes.

Cotton, both unprepared and alumed, acquired only a dull yellow colour; unprepared silk took a bad ruffet-brown; but by means of nitromuriat of tin acquired a good orange yellow.

The result of these experiments is, that the Hhennê abounds in colouring matter, which may be advantageously employed in dyeing wool; that by itself it gives permanent fawn colours, and that by means of alum and sulphat of iron it may be made to yield different shades of brown, valuable for their variety, their cheapness and permanency.

EUDIOMETRICAL OBSERVATIONS.

By Citizen BERTHOLLET.

SINCE the discovery of the composition of atmospheric air, various attempts have been made to ascertain the relative proportion of the oxygenous and azotic gas, with all the variations arising from climate and other causes. A general acquiescence has not, however, yet been obtained with regard to the best method of doing this.

Advantage was first taken of the property of nitrous gas to absorb oxygen gas, and chemists were contented with noting the diminution of volume in the air thus examined, taking for granted that the purity of the air was in exact proportion to the diminution which it experienced.

Enquiry was then made into the real quantity of oxygen that combined with the nitrous gas, in order to determine, by the absorption produced on mixture of the two gasses, the proportion of oxygen and azot in atmospheric air.

Nitrous gas, however, will not give the same result without great care in its preparation, as Ingenhouse has shewn long since; when therefore

fore we wish to estimate from this the proportion of oxygen gas, we shall find ourselves destitute of any fixed basis for estimating what proportion of the absorption is due to the nitrous gas, and what to the oxygen.

I find, by an extract in the *bulletin de la Société Philomathique*, which has just reached us, that M. Humboldt has endeavoured, by several ingenious experiments, to do away the uncertainty originating from variations in the nitrous gas, and that he offers as correct, a method of determining by this re-agent the exact proportion of oxygen gas, by introducing several corrections into his calculations. I hope, however, to prove from experiments that I am now engaged in* with citizen Champy, jun. that this method is founded on inadmissible suppositions.

Volta's proof by hydrogen gas is far more precise, but has the disadvantage of requiring a complicated apparatus; and variations may be produced in the hydrogen from the quantity of carbon held by it in solution, so as to cause a sen-

* These experiments were not yet finished when I quitted Cairo, and not having brought with me the minutes containing the calculations, I have been obliged to recommence my experiments, the result of which I shall shortly publish.

fible difference in the result. This method may nevertheless be regarded as sufficiently exact, when nothing more is wanted than the comparison of different airs, and when the hydrogen employed is all of the same kind; but accuracy must not be expected in this way, if the intention is to determine the absolute quantity of oxygen. The proportions by weight of oxygen and hydrogen that enter into the composition of water are sufficiently well known, but the relative specific gravities of the two gasses are not yet exactly ascertained; the difference also observable in hydrogen renders it impossible to proportion accurately the respective shares of the oxygen and hydrogen in the diminution of bulk caused by their combustion.

Liquid alkaline sulphuret presents the double advantage of giving at the same time the relative proportions of the air submitted to experiment, and the absolute quantity of oxygen gas, for the whole diminution is here due to the oxygen, whereas in the preceding methods it is divided between the oxygen and nitrous gas, or hydrogen. There is also no occasion for any further corrections than what are required by the different temperature and atmospheric pressure, at the time when the air was begun to be operated

operated on, and when the diminution was calculated.

It is impossible that the absorption of oxygen should be incomplete when water sufficiently charged with sulphuret is made use of, on account of the greatly superior affinity between sulphuret and oxygen, than between this last and azotic gas; and if any diminution should be experienced, after the separation of the oxygen, by mixing the azot with nitrous gas, this is not to be attributed to any remaining oxygen, as I shall presently show.

It must indeed be allowed that the volume of the remaining air is not precisely the actual bulk of the azot, because it holds in solution a little sulphuret, or rather sulphurated hydrogen, which always exists in the liquid sulphuret; and this mixture may be detected by its peculiar smell; but by washing the azot with a little water its odour entirely disappears, without any sensible decrease of its bulk, shewing the quantity of sulphurated hydrogen to be extremely small.

There is no fear of the azot itself being absorbed by the sulphuret, for if this absorption begun it would go on, whereas the volume of azotic gas confined over sulphuret remains permanent as soon as the oxygen is absorbed.

It

It is possible therefore to determine, by means of the liquid sulphuret, the proportion of oxygen contained in any air, with as great precision as can reasonably be expected from chemical reagents.

The only inconvenience of this method is the slowness with which the sulphuret acts, requiring several days, especially at a low temperature, and giving no other certain proof of the completion of the absorption than its actual cessation, which requires a still farther time to be certain of.

Guyton has proposed to make use of dry sulphuret, applying to it the heat of a lamp by an apparatus that he describes. I have not made trial of this method, but am inclined to apprehend that the contact of a small piece of sulphuret will scarcely ensure the absorption of all the oxygen, and even if this were the case, it appears to possess no superiority over the former method. I have proposed, in the *Journal de l'Ecole Polytechnique*, the making use of the gradual combustion of phosphorus; for this purpose a cylinder of phosphorus fixed to the end of a glass rod is to be placed in a narrow jar, containing the air under examination; if the temperature is considerable, the jar should be completely

immerfed in water, to prevent the melting of the phosphorus, for the evaporation from the surface of the water keeps it constantly at a temperature a few degrees lower than that of the atmosphere. Thus, during the experiments which I made here, the centigrade thermometer stood at about 36° in the open air, and the water-bath was about 6° lower. As soon as the phosphorus is introduced into the air a cloud is immediately formed, which descends and mixes with the water. At soon as the operation is finished the cloud, which is luminous in the dark, will have disappeared, and no more sensible absorption, even during the course of several days will take place, so that this method has the advantage of furnishing a certain proof of the end of the operation: if made in a narrow tube it requires no more than two hours at the above temperature for its extreme absorption *.

The air which is submitted to the test is measured in a graduated tube; when the operation is concluded, the remaining gas is measured in the same tube, taking the accustomed precau-

* On repeating these experiments at Paris in a temperature from 6° to 60° of the centigrade thermometer, I found the operation completely finished in six or eight hours.

tions, and making the necessary corrections for the change of temperature or atmospheric pressure which may have taken place during the trial.

The diminution obtained by phosphorus is found always less considerable than that produced by the sulphuret, but in a constant and certain proportion, the reason of which is, that the phosphorus partly dissolves in azotic gas, as I have proved by experiment, and in dissolving it assumes the aeriform state, as does every other substance during its solution in any gas. The volume of the azot is thus augmented, and from repeated experiments I have ascertained the increase to be nearly a fortieth of its bulk *.

We cannot attribute the difference of diminution in bulk occasioned by phosphorus over that from the sulphuret to the latter abstracting more oxygen than the former, for the action of phosphorus upon oxygen is so powerful, when it is dissolved in azotic air, that it is only necessary to pass the phosphorated azot through water to render it luminous, owing to the combustion of the oxygen which it meets with in that fluid.

* This experiment, repeated at Paris, gave me the same result.

It appears to me that sulphurated hydrogen, when dissolving in azotic gas, is capable of precipitating from it the greater part of the phosphorus which it may hold dissolved, for if phosphorated azotic gas is put in contact with alkaline sulphuret, the gas diminishes in bulk: however, the extent of this diminution is not so great as it would have been if the air had been at first placed over alkaline sulphuret. The phosphorate azot when thus diminished by the sulphuret is no longer rendered luminous by oxygen gas.

If I introduce phosphorus into azotic gas already in contact with the sulphuret it produces no sensible effect; but if I wash this azot by passing through pure water, this is sufficient to render the phosphorus afterwards luminous: so that in this operation the water retains the greater part of the sulphurated hydrogen, and supplies a very small quantity of oxygen to the azotic gas, which by this means is rendered able to dissolve phosphorus, and this compound again to act upon the smallest possible quantity of oxygen.

Whatever truth there may be in the explanation of these facts, I have observed that azotic gas which has been exposed to sulphuret neither

gains

gains nor loses any sensible bulk when it is passed through water, and that the combustion which takes place afterwards, when phosphorus is introduced, is in so small a degree as to be almost inappreciable.

From what has been said, we may conclude, that the cudiometer, by means of phosphorus, unites precision to convenience, and does not require any troublesome length of time ; it likewise gives certain results when we only wish to compare different airs : it requires a correction of a fortieth of the bulk of the residual air, when we wish to determine the proportion of oxygen with the same accuracy as when the sulphuret is used, and the whole appears to me to be the nearest approximation to perfect precision which we can obtain by any known method*.

* M. Humboldt supposes that there takes place a triple combination of phosphorus, azot and oxygen (*Ann. de Chymie, 30th Thermidor, an. 6*). His opinion is founded on experiments in which he has observed, that phosphorus produced unequal diminution of both in atmospheric air exposed to its action in tubes of equal dimensions, and in the same circumstances. The difference in two experiments was in the proportion of 115 to 156. It was upon this result alone that he supposes the existence of oxygenated phosphoret of azot. I have perceived no differences of the kind in the numerous experiments which I made at Cairo and at Paris.

A variety of experiments made by citizen Champy the younger and myself, in the laboratory of the Institute, both with alkaline sulphuret and phosphorus, and in which we did not neglect the corrections required by the change of temperature, as well as by the dilatation of azotic gas by an acquisition of phosphorus, have convinced us that the proportion of oxygen in atmospherical air was in this place somewhat less than 22 in the hundred; and as by a great number of experiments we in no case found a difference of more than half a hundredth part, it is more natural to attribute so slight a variation to an inevitable imperfection in every process of experimental philosophy, than to any real change in the state of the atmosphere.

Repeated trials made by myself at Paris by the same means, appear to shew, that the proportion of oxygen in this place is nearly the same as at Cairo.

However, I must acknowledge, that I have not so accurate a recollection of these experiments, as to be able to affirm this with the same confidence. It will be necessary to repeat these trials, to arrive at a certain conclusion*.

Several

* The experiments which I have just made at Paris, give me one, two hundredth more of residual air: they coincide perfectly

Several eminent chemists and natural philosophers allow a greater proportion of oxygen in atmospheric air than what I have given, and they assert that they have found considerable variations in the air of different places and at different seasons. Lately Humboldt has made the proportions of oxygen vary from 23 to 29 in the 100.

I have not observed such alterations in the distance from Cairo and Paris, in a variety of seasons and climates: they certainly ought to be attributed to the state of the nitrous gas, which is

perfectly with those which I made at a former period. It appears probable that this slight difference is owing to the very dry air of Cairo, saturating itself with water during the experiments, and thereby experiencing a slight dilatation, rather than any real difference in the constitution of the air of the two atmospheres; but however the result is, that the proportion of oxygen gas should be fixed a little above 22 in the 100.

Experience must decide between the opinions of M. Humboldt and myself. It will be sufficient to examine whether it is true that phosphorus and liquid sulphuret produce an uniform and constant result, as I have affirmed that they do: I do not speak of the rapid combustion of phosphorus, concerning which there would be other considerations to be noticed.

When the slow action of phosphorus is had recourse to, the stick of phosphorus should occupy a great part of the height of the tube in which the trial is made, in order that the whole of the atmospherical air may be exposed to its action.

usually employed for these experiments. It is agreed on all hands, that trials with this agent cannot be compared one with another, if there happen to be any difference in the water made use of, in the nitrous gas, in the dimensions of the tubes, in the way of conducting the experiment: yet the favourers of this method swell, with great ingenuity, the list of necessary corrections, founded on suppositions which are not justified by experience; and on the other hand, reject those constant methods of eudiometrical observation on which no just suspicion has been thrown, and which perhaps are only laid aside in Europe, because they have so much simplicity.

How, indeed, can we suppose that the atmosphere, continually agitated by rapid motions, and continually changing its place with a restless activity, can vary considerably in composition from village to village; allowing however for those spots that are greatly elevated above the level of the sea. The difference of specific gravity between oxygen and azot, which in their elastic state exert but a very weak reciprocal action, is sufficient to explain the difference which has been found in their respective proportions.

OBSERVATIONS

On certain Processes for correcting the Defects of particular Kinds of Steel and Cast Iron.

By Citizen LEON LE VAVASEUR, Chief of Brigade, Director of Artillery to the Marine in the Port of Alexandria.

FOR a considerable time that I have been employed in directing the labours of the arsenal, I have always considered it of great importance to turn to some use the stuff which is thrown aside as faulty, or to diminish those defects which cause it to be rejected. When we are abundantly supplied with means for carrying on these operations, and have an ample choice of materials, it would be doubtless absurd to work in preference upon those that are imperfect. Besides, that it is almost impossible to give such materials entirely the same goodness as those which are at first of excellent quality; such an attempt must necessarily be attended with a great increase of expence, which a prudent overseer will always avoid; but at the same time, he ought to be provided against the time when a proper supply may fail, and when he will be reduced

duced to the necessity of bringing into use such stuff as in a time of plenty is thrown aside as waste; and therefore he should be prepared beforehand with the means of continuing his work even in the time of a scarcity.

It has often occurred to me, that I might be sent into a colony almost unprovided with necessities for an arsenal, or at least only furnished with all kinds of refuse matter from the magazines of Europe, and that on this account I ought to qualify myself to overcome by art and industry the difficulties which would be thrown in my way.

Iron is the metal to which I have particularly turned my attention, as it is that which furnishes the instruments of the first importance in all arts.

The metal may be defective, either from a faulty preparation in the forges where it is first procured, or from its nature in being intimately united to foreign substances, to separate which, common means have hitherto proved insufficient.

In the first case, the iron is scaly, porous, and has but little tenacity.

In the hands of a workman of a little dexterity these faults however may soon be removed: repeated forging and hammering, conducted with skill,

skill, and well followed up, will bring together the open porous texture, and produce a tough cohesion, instead of a mere grain, especially if it has not been cooled too hastily.

This will not be the case, however, where the defects are inherent in the nature of the iron, and arising from its more or less intimate combination with foreign substances that render it brittle, and give great trouble to those workmen who do not know how to manage it.

We distinguish two kinds of faulty iron, the hot-short, called by the workmen, rufset colour-ed iron (*rouverain*) and the cold-short, which is brittle when cold.

The former, which is very tenacious when cold, breaks under the hammer when hot, and is commonly thrown aside in arsenals as the worst kind of iron: it is, however, the most valuable, to those who know how to work it, and I mean here to give a very simple method of managing it, which I learned in the department of Isere, where it is very common, and which has answered with success the trials that have been made of it in the forge of the ordnance in the dock-yard of Toulon.

This iron must be heated to whiteness, and almost till it melts, and forged in this state; when its

its glow abates, and it begins to grow red, the forging must be stopped, for it is at this time that it becomes brittle under the hammer, and would split if the hammering were continued. When it is become of a faint cherry red, it may be again worked, and forged till it is cold. The cooling may indeed be hastened by plunging it in water.

I proved some hot-short iron thrown aside as refuse at Toulon, and wrought it the same way I have just been mentioning.

There are two methods of trying the tenacity of iron; the one by means of a weight suspended at one extremity of a bar, whilst the other is firmly fixed in a wall; the other by means of twisting. For this last trial I fixed in a vice a bar made with an eye, through which was passed a lever of iron: it required a great force to twist off the stem of that made of hot-short iron, whilst another made with what passed for the best iron in the forges broke with ease.

In the first trial (by means of a weight) the mean degree of tenacity was found to be in favour of the hot-short iron in the proportion of 4 to 3. The degree in the second trial, which was much more to the advantage of the hot-short iron, could not be assigned with accuracy.

I recollect

I recollect an anecdote on this subject, which happened at Toulon in 1749, which confirms what I have been just mentioning, and which was taken down at the time in writing.

“ The forge-master of this port, in the interest
“ perhaps of the iron-masters of Franche Comté,
“ wished to put down the iron of St. Gervais, in
“ Dauphiny; and had forged certain pieces of
“ this iron, which was found defective.

“ The administration of the marine thought
“ that they ought not lightly to pass a condem-
“ nation on this iron, which had so long en-
“ joyed a high reputation: they therefore named
“ a commission, which was to cause comparative
“ experiments to be made before them of the
“ iron of St. Gervais and that of Franche Comté,
“ wrought by forge-masters of the town who
“ were in the greatest credit for skill and fair-
“ ness; and a master came from St. Gervais for
“ this purpose. A hook was forged out of iron
“ of each sort; that of the Franche Comté was
“ fourteen lines and a half in diameter; but for
“ want of sufficient material, that of the St.
“ Gervais iron was only thirteen lines and a
“ quarter: but notwithstanding this unfavour-
“ able circumstance, the latter was found much
“ superior. Each of these hooks was struck
“ with

“ with a force perfectly equal and simultaneous,
“ by means of proper apparatus; that of Franche
“ Comté iron broke in three places; but the
“ St. Gervais resisted the force so well, that it
“ was compressed by the blow, but not broken.
“ After so decisive a proof, the St. Gervais iron
“ was judged superior to any other for works
“ that required flexibility and elasticity, as ship’s
“ chains, mast rings, &c.”

In spite of these trials, however, former prejudices prevailed so far, that at the end of the year 5 there was in the arsenal of the fleet at Toulon a considerable deposit of this iron, which had been thrown aside, and which the administration were happy to sell at a very inferior price.

It must be acknowledged, that the high degree of heat requisite for working this iron, and the number of forgings that it is necessary to use, occasion a much greater expence, both in fuel and labour, as well as a more considerable loss, which makes the use of this iron by no means economical. But where it is of the greatest importance to obtain a great degree of solidity and tenacity, as in several necessary works, economy should be only a secondary consideration.

I should

I should therefore advise the employing always in preference, and without regard to the encrease of expence, the hot-short iron for all works where there is much strain, as in ship chains, rigging hooks, mast rings, and the like.

Since the trials that I have mentioned above, there have been manufactured at Toulon, out of this iron, all the necessary iron works for the waggons used to transport to Paris the specimens of the arts which were obtained in Italy.

I may just mention, that the springs of these carriages were made of steel, of cementation in like manner made from this material.

Hot-short iron appears to owe its fragility to the union of some other metal, but we do not yet know what it is. It has been thought to be arsenic or zinc; I rather am inclined to think that copper also has a share in producing this effect. The ore of the mines of Alevard, which supply the smelting furnaces, and furnish metal for all the forges in the department of Isere, often contains grey copper ore. There is likewise found another copper ore, called marcasite, which is carefully rejected, because it makes the metal very bad, and difficult to work.

I believe I have read in Jars, that a slight addition of copper gave more body to the iron.

The

The different degree of fusibility of these two metals occasions the difficulty which is experienced in attempting to forge this iron at the usual degree of heat.

If the alloy, whatever it be, enters into fusion before the iron, the union between the parts ceases, and the bar flies under the hammer. If the heat is so great as to soften the most refractory of the two metals, they will remain in union, and may be worked without risk: as soon, however, as the temperature is lowered, the incohesion recommences, and it is necessary to wait till the mass is become cold before it can be safely wrought, such are the circumstances that require attention in the working of hot-shot iron. The effect of the high heat to which it is necessary to expose this kind of iron, is obviously not the volatilization of the alloy; if this was the case, the iron, after the volatilization of that which rendered it hot-short, would become pure: but, on the contrary, hot-short iron always preserves its peculiar properties, and every time that it is worked the above precautions are absolutely necessary.

The cold-short irons may be ranged in two classes; the first including all those varieties which owe this property to mismanagement in the refineries,

fineries, the carbon that they contain in the state of cast-iron not having been completely burnt off, so that they still contain some particles of steel.

The second class comprehends those which owe their brittleness to phosphorus, or the phosphoric acid, with which they were combined while in the ore, and from which the smelting furnace can scarcely ever free them.

The projection of weak nitre acid upon the metal will easily discover the first class, by producing black veins, which detect the charcoal.

The second is discovered by adding sulphuric acid, which will not dissolve the phosphat of iron.

I have succeeded in softening and rendering flexible the wrought iron of the first kind, by treating it in the manner of too hard steel, when it is to be softened to be cut into files. I shall speak afterwards of the particulars of the process.

With regard to iron which owes its brittleness to the presence of phosphorus or phosphoric acid, I look upon it as very difficult to correct this defect, except in the refinery. The method followed by Rinman the son (*Journal des Mines* No. 5. Pluv. an. 3) is as follows:—He begins

by smelting together equal parts of lime and scoriae; of this vitreous matter he mixes one hundred and forty parts with two hundred and sixty parts of cold-short iron, and, by fusing the whole together, obtains one hundred and ninety parts of bar iron, soft, and of the best quality.

My distance from a work-shop, at my own disposal, prevented me from making many experiments on the conversion of cold-short iron to the state of bar iron; I have however made a few, and with moderate success, though not sufficient to satisfy myself. In fact, though I succeeded in giving to cold-short iron more tenacity than it had at first, I have however never been able to make it equally good with that which was originally free from this defect.

As no one attaches less importance than myself to what are called secrets, and as the success of another is as pleasing to me as my own, I shall enter into a detail of the processes that I have tried, in order that any one who has occasion to undertake similar pursuits may derive some advantage from them.

I regret not having brought with me the register of the results of my experiments; in this it would have appeared that though I have not always succeeded to my entire satisfaction, yet that

that I have constantly obtained some advantages from my operations. I made use of two methods: the one, cementation with lime, the other forging in lime. I first reduced my bars to thin plates, then soaked them in thick milk of lime, and afterwards heated them, taking care to cool them again in milk of lime; I then softened them in a very high heat, and sprinkled them over with fine slack'd lime and forged them; I then doubled the plates, and forged them to the necessary dimensions, taking care to expose them as much as possible to the contact of lime.

It is obvious that the length of these operations would occasion a great consumption of fuel, and much consequent expence, but in circumstances where none but cold-short iron was to be had, the cost might well be endured, provided this very important defect could by this means be considerably remedied.

To return to the different kinds of steel. The want of steel in the marine arsenal at Toulon, during the years two and three of the republic, and the vast demand for it at all the workshops, induced me to undertake, in those belonging to the marine artillery, a manufactory of steel of cementation, according to the process published

by the Committee of Public Safety. I was tolerably successful, and during nearly two years the arsenal of Toulon made use of scarcely any other than what came out of the furnace that I had established ; I made of it all kinds of tools and files, but the fabrication of these last gave me much trouble. My steel, although untempered, was frequently so hard as not to be cut by the sheers, breaking rather than bear being cut into shape. All the common receipts of the workmen, each of whom has his peculiar compound, were of no avail, and I had also an objection to making use of those whose action I could not explain : at length I tried the following, and had the pleasure of finding it completely successful.

I oxydated, by exposure to air or immersion in water, the outside of the bars of steel which I wished to soften, and in the same manner reduced to oxyd, iron filings, chippings, and other refuse pieces (the native ochery oxyds of iron, and especially black manganese may be made use of for the same purpose) ; these oxyds and the steel bars were stratified in a cage which was strongly heated, as if for the cementation of steel : a proof piece placed in the centre of the cage served to shew the progress of the operation ; as soon as it had proceeded far enough the fire was

was suffered to go out, and the case to cool gradually. The oxygen furnished by the oxyds of iron had burnt out the carbon from the outer surface of the steel bars, and had superficially converted them into iron, as was evident from the ease with which they were worked by the graver or file; another proof of this was furnished by the action of the nitric acid, which left a white ring round every drop, whereas on steel it makes a black border. Some bars were by the above process wholly converted into iron, which worked just the same as common iron.

Those bars which were intended to be made into files, were first shaped and stamped, and then cemented in the common way, by which means they were re-converted into hard steel.

I banished from the materials of cementation the garlic, vinegar, oxgall, and all the other sauces with which the workmen from father to son had been accustomed to season this operation, the only substance which I made use of was charcoal, moistened sometimes with urine; and even this last article may be suppressed, being even prejudicial in certain cases, but I have observed where great hardness is required, and where the brittleness is of no consequence, that it was of use, probably by forming a little phosphat of

iron. In the same case, namely that which was filled with the oxydated cement, I put some pieces of a very hard iron incapable of being worked by the graver and the common tools; it was rendered quite soft: I then supposed that the iron was in part carbonated, and was convinced of this by the test of the nitric acid.

I also put in the same case a few pieces of very hard and brittle cast iron, some of which were so completely softened as to be capable of filing and working just like the best soft iron; one of these pieces compared with regard to its tenacity with another of the same kind was found to be in the proportion of five to three.

Other pieces of the same size, the same hardness, the same external appearance, and prepared in the same manner, underwent no change in the operation. This difference of result at first disconcerted me, but I soon after discovered the reason.

Steel differs from iron only by the addition of carbon; but in cast iron there is besides carbon a variable proportion of oxygen, and the relative proportions of the two should be carefully attended to in the conversion of cast iron into bar iron.

If the oxygen and carbon are at the point of mutual saturation, it is only necessary to apply heat

heat to bring them into combination ; in this case all the earthy cements may be employed, but the best of these is lime, on account of the ease with which it absorbs the carbonic acid as soon as formed. If the oxygen is in excess, carbonaceous cements with lime ought to be made use of ; if the carbon exceeds, then the oxydinating cement, which converts steel into iron, brings about the desired effect.

My conjectures on this head were further verified by the nitric acid, all the pieces of cast iron which had remained unaltered by the cement being white iron, upon which the oxydinating cement could have no action ; that piece which on the other hand had been so much softened was black iron. It is no longer therefore surprizing that there was a want of uniformity in the results, since each species of iron requires a different cement. It is scarcely necessary to say that the oxydinating cement may be used for any number of times, care being taken to restore to it, by the contact of air and water the oxygen of which it has been deprived after each cementation.

None of the experiments of which I have given an account were made by myself, on account of my absence from Toulon, but I direct-

ed them by means of a correspondence which I held with citizen Thuez, at that time an officer in the artillery shops of the marine at Toulon, and at present head of the same department in the port of Alexandria. He used to write me an account of the results, from which I directed the subsequent experiments.

The whole of this business has been transacted by him with great accuracy and skill, and the correctness of his reports may be depended on. If I had been myself on the spot, I should have made many more experiments; such as they are, however, they will not I trust be destitute of interest, and this has been my inducement in drawing up the preceding account; it is possible also that they may be here applied to advantage, and this is a sufficient apology for them, if they stand in need of any.

REPORT ON THE OASES.

Citizen RIPAULT presented to the Institute, a Memoir, intitled, "Researches on the Oases;" and Citizen FOURIER read the Report of the Commissioners appointed to examine that Memoir.

THE Oases are tracts of cultivated land, situated like islands, in the midst of the deserts of Lybia. In these cantons an abundance of water preserves perpetual vegetation; a profusion of trees of different kinds adorn the soil, and the inhabitants collect a considerable quantity of fruit.

The writers of Greece, and those of the middle ages, have described this species of islands with an accuracy which might have been deemed satisfactory, if their text had not been obscured by a multitude of commentaries. These discussions have involved this subject in an uncertainty, which it is necessary to dissipate.

Strabo hath enumerated only three Oases, although many other cantons may be included under that denomination. The principal object of the memoir of citizen Ripault was to ascertain with

with precision the position of those three Oases, which he has done with much distinctness.

The first, or the *Oasis magna*, is situated, almost as high as Jirjeh, in the parallel of 26 degrees and a half. The second, or *Oasis parva*, is in the latitude of 29 degrees, 2 minutes, which is nearly the parallel of Beniçouef. With regard to the third Oasis, the author of the memoir has made it appear, that it is none other than the little country now called Siwah, concerning which he collected, at Alexandria, much interesting information: its latitude is 29 degrees 20 minutes.

The writer whose opinion is most opposite to that adopted in the memoir, is the author of questions proposed to the Danish travellers*. His opinion is confusedly stated, in the Latin commentary on Aboulfeda; but, as it almost directly contradicts the accounts of Herodotus, Strabo and Ptolomy, any refutation of it seems unnecessary.

There is scarcely an article in the ancient geography, on which more errors have been committed, than on the subject of the Oases. Modern travellers and historians appear to have entertained very incorrect ideas of them. Savary

* Michaelis.

alters

alters their latitude several degrees, places the Oasis of Ammon at random on his map, and banishes thither the great Athanasius, though that saint never was there: and he advises those who would undertake to recover the ancient literature of the Egyptians, to search those islands carefully for books, which, being lost to the rest of the world, cannot fail to be there!

Niebuhr and Norden make no mention of any of the three Oases; and Pocock briefly reports what had been written by others on the subject. But the positions of the two first are determined with precision in the maps of Danville; though, in tracing the Ammonian Oasis, that illustrious geographer does not distinguish it from the temple of Ammon, and places, at a little distance from its site, the ancient city of Mareotis, on the territory of Siwah.

Doctor Poncet and Lenoir du Roule are the only Europeans, who are known to have penetrated into the great Elouah; and, by the accounts of the former, that country is not less than twenty-five leagues in length, and four or five in breadth. The papers of the latter were lost at Sennaar, where that ambassador of Louis XIV, perished in a tumult; the victim of his own

zeal

zeal, and the machinations carried on in a convent*.

Siwah is situated to the westward of Ammon. A young Englishman, of the name of Browne, whose

* The conversion of Abyssinia to the catholic faith, has several times excited the zeal of missionaries. The reformed Franciscans, and the fathers of the holy land, who contended for the mission to Egypt, were still more ardently solicitous to be charged with the re-establishment of the Romish religion in Ethiopia. The priests of the holy land possessed most credit at Rome ; but their rivals, the Franciscans, supported their pretensions, by representing the numerous services which they incessantly rendered to the Christians in Nubia. Not that there were any other Christians than the Franciscans themselves in that country ; but they indulged that supposition, without which their mission would have had no object.

During this contest, the enterprize, of which they mutually strove to have the honour, flattered the ambition of the Jesuits. That order then possessed no influence at the court of Rome ; but they had recourse to the powerful mediation of Louis XIV.

That monarch represented to the pope, that the Jesuits were much more capable, than the Franciscans and Capuchins, of securing the triumph of the faith in Ethiopia. The pope appeared to acquiesce ; but, at the same time that he authorized the Jesuits to fulfil the religious views of the king of France, he charged a monk of a different order, with the execution of his own designs ; and, as if he had had a mind to bestow the country on the first occupant, he added, that the most able might make a beginning.

The

whose travels are now in the press*, hath visited the temple of Ammon, and the country of Si-wah. Citizen Ripault hath collected from the inhabitants

The Jesuits, to elude this new competition, made application to the French consul at Cairo. That officer, the author of *Tellamed*, an impious work proscribed by the Sorbonne, and the Jesuits, whose ambitious conduct had before expelled them from Abyssinia, laboured in conjunction with the king of France, to supplant the monks of St. Francis, in the project of converting the people of that country. The Jesuits, according to their custom, had furnished a political motive for that intrigue ; and shewing as much zeal for the glory of the monarch as for the interests of religion, they engaged to prevail on the king of Abyssinia, to send a pompous embassy to Louis XIV. The consul, Maillet, seized this idea with avidity, and took advantage of the first opportunity which presented itself.

Jesus (*Yegous*) king of Abyssinia, had long laboured under a malady, for which he had in vain consulted his own physicians, and he therefore invited the most learned of that profession, from other countries. Hajy Ali, who was charged with that commission, was afflicted with the same disorder, and consequently was to experience, in his own person, the effects of the remedies prescribed. Charles Poncet, a French physician residing at Cairo, was recommended by Maillet ; instead of two Capuchins, who practised medicine, and whom A'ly had himself chosen ; and the consul gave him, as a companion, Father Brevedent, a Jesuit, who possessed a great character for knowledge and piety.

* Browne's Travels have since been published in London.—*Translator.*

inhabitants themselves, the accounts which are subjoined to his memoir.

The civil history of the Oases is but little known,

piety. To avoid the uneasiness he was likely to experience, under the justly dreaded name of a Jesuit, the father attended Poncet as his servant. He was one of the most ardent missionaries the church ever possessed. His brethren have bestowed many eulogies on his sincerity and zeal, and he confirmed their testimony by working miracles, of which Poncet said he had been a witness. Bruce adds that Father Brevedent was an excellent mathematician; of this we have proofs, in the writings of that period, which shew that he had sought and *found* a perpetual motion!

It required indeed nothing less than a man accustomed to perform impossibilities, to establish the Romish religion in a country where the Jesuits had already developed their views, and where the outrages committed by the Portuguese, some time after the expedition of Gama, had rendered the name of European odious. The double talent of the French Jesuit was not more useful to the progress of religion, than to that of the sciences; for, after taking the latitudes of some places, in which he appeared to be grossly mistaken, he died before he reached Gondar, like Saint Francis Xavier, within sight of China, which he went to convert.

Poncet continued his journey, and according to his own account, soon after his arrival in the capital, he cured the king and the royal family. The Jesuits afterwards printed an account of his journey in the *Recueil des Lettres Edifiantes*, accompanied with a recital of every thing which could be useful to their interests. There we read, that Poncet

known, and cannot be supposed very fertile in events. According to Herodotus, fifty thousand men belonging to the army of Cambyses, employed in

cet made a strong impression on the Abyssinian monarch, whom he daily entertained with anecdotes of Louis XIV. assuring us that that prince was known in Ethiopia as the hero of Europe, and France, as the finest country in the world; that king Yéçous had long resolved to send an embassy to Paris; and that his own son, then but eight years of age, and consequently too young to undertake the journey, was already destined to fulfil that important trust; that the king had a singular taste for the sciences, and that he received lessons in chemistry from the physician at Cairo; that he conversed very learnedly with Poncet, on the distinction of the two natures of Jesus Christ; that he had himself discovered the error of the Copts and the Eutychians, and that he was not far from agreeing with the Jesuits concerning that important question, on which depended the salvation of Abyssinia. Poncet, on leaving Gondar, brought an ambassador with him: It appears that an Arminian stranger, of the name of Mourat, was in fact entrusted with letters and some presents for the court of France, and that he came to Cairo with Poncet, who alone brought the accounts to Paris. The Consul Maillet had a dispute with the Ethiopian ambassador; and, on the other hand Poncet, whose first reception was very flattering, was ill treated by several of the dignified clergy in France. They maintained that his journey was an imposture; that he had never been at Gondar; and that Ethiopia was a very different country from that which he described; and they supported these reproaches

in attempting the unprofitable conquest of the country of the Ammonians, perished in the sands, at some distance from the great Oasis. The author

reproaches with the most puerile arguments. Thus were Poncet and Mourat abandoned to their fate.

In France, however, the project of preaching the Romish faith in Ethiopia was persisted in; and it immediately became a question, how the first advances of this outlandish king should be answered. The embassy was offered to Maillet, who, dreading the fatigues and dangers to which the enterprize would expose him, recommended Le Noir du Roule, the French vice-consul at Damietta, as a proper person to undertake it. That young Frenchman was distinguished by his zeal for the interests of his nation, and by the brilliant qualities of his mind. The glory of the mission seduced his imagination, and he fulfilled it with more enthusiasm than prudence.

He set out from Cairo in 1704; and soon became sensible of the difficulties and dangers with which he was surrounded. In truth, the Franciscans and the Capuchins could not pardon this attempt to convert Abyssinia without their participation, and resolved to take vengeance on the ambassador. He bore the commission of the most powerful monarch in Europe; the Pacha of Cairo and Ismael Bey had, by express orders and warm recommendations, endeavoured to secure the safety of his person; the king of Abyssinia, being apprised that Du Roule was on the journey, had informed the princes of Nubia, his allies, how much he wished to receive the ambassador: all these favourable circumstances, however, afforded but a weak protection against the machinations

thor of the memoir is too well acquainted with Herodotus, and the small population of Ammon, not to have discovered the exaggeration of this recital ; and he thought it unworthy of a single remark.

machinations of angry monks. The attendants of Du Roule could not refrain from tears at his departure ; so well did they know the influence of those priests.

They persuaded the merchants that the expedition would ruin their commerce ; the Mahometans, that this was an attempt to convert Nubia to christianity ; the christians were told that the interests of religion were manifestly neglected ; the princes of the countries through which the embassy was to pass, were alarmed for the existence of their authority ; and the people at large were assured, that it was composed of sorcerers, whose errand to Ethiopia was, to stop the course of the river. All these reports were readily believed. Du Roule wrote letter after letter to the Consul of France, drew up a state of facts, and firmly rejected the advice which was given him to return. Death threatened him in every town in Nubia, and he met it at Sennaar, before the king's palace. The Frenchmen who composed his suite were massacred at the same time : he had ordered them to make no resistance.

This crime passed unpunished, which would not have been the case, if the Court of France had been as solicitous as the king of Abyssinia was, to convict the authors of it ; but at that time they had other outrages to revenge.

The papers of Du Roule were lost ; and those which have been quoted by Danville were written at Cairo, before that unfortunate man entered on his journey to Nubia.

Note of Citizen FOURIER.

A a

We

We shall not stop to describe the well known journey of Alexander, to the temple of Ammon. The successors of that great man, the two first Ptolemies, whose glory is durable, because committed to the grateful remembrance of literature and the sciences, which they cherished, rendered those little countries, as well as the rest of Egypt, happy under their wise administration.

Some ages afterwards, these isolated cantons resounded with theological controversies. The successors of Cæsar, and of Marcus Aurelius, in obedience to the decrees of the councils, banished the sectaries to the Oases. There Nestorius, for many years, expiated the crime of having over much distinguished the two natures, at the same time that Eutyches suffered for having confounded them.

The sequestered situation of the Oases, which formerly could not defend them from ecclesiastical dissents, did not afford them greater security against the oppression of the Beys, in more modern times.

The memoir of citizen Ripault contains a number of useful observations, supported by solid reasonings. It is a critical work, written with judgment and perspicuity, and justifies the choice of the Institute, in appointing the author to fill the

the place of librarian. We entreat him to continue his literary researches, and, particularly, to finish the French translation of *Abou-l-feda*,* from

* *Abou-l-feda* is a writer very much celebrated among the Orientals, and is even advantageously known in Europe, in the double capacity of geographer and historian; and he has well merited the reputation of being one of the most candid and accurate of the Arabian authors.

His entire name, as it stands in the title of his works, is *E'mad-ed-dyn Abou-l-feda Ismael Ebn-Nasser*; that is, *The pillar of religion, the father of redemption, Ismael, the son of Nasser*, or of the protector. Some authors, arranging his different names and surnames, in another order, write them thus; *Isma'yl ebn A'ly el-malek el-mouyad e' mad-ed-dyn Abou-l-feda saheb Hamah*, that is *Ismael the son of A'ly, the happy and helpful king, the support of religion, Abou-l-feda, the sovereign of Hamah*. Some give him still an additional surname, that of *Ebn el-afdhāl A'ly*.

According to the commonly received opinion, *Abou-l-feda* was born in the year of the Hegira 672, or in the year 1273, of the vulgar æra. He bore the title of Sultan of Hamah, a town and principality, near Damascus, in Syria. To Hamah he assigns, in his geography, 60 degrees 45 minutes of longitude, and 34 degrees 45 minutes of north latitude.

His brother Ahmed, surnamed *el-Malek en-Nasser*, that is, *the Protector King*, was sovereign of Hamah, and reigned there till the 729th year of the Hegira, being the 1328th of the vulgar æra, when he was deposed. *Abou-l-feda* succeeded him, and on his accession to the throne, assumed the title of *el-Malek es Saleh*; that is *the virtuous king*. But

from the Latin edition of Michaelis. We regret that we have, in this country, only one of the works

his advanced age did not permit him long to enjoy this dignity ; for he died in the third year of his reign, and the sixtieth of his age, in the year of the Hegira 732, or 1331 of the vulgar æra. Some historians assign him a longer life, protracting it to the 746th year of the Hegira, which answers to the 1345th of the vulgar æra.

Aboulfedha is the author of two considerable works, which are often quoted, not only by the oriental writers, but by such of the Europeans as have treated of the political and geographical history of the East. The first of these, entitled *Tekouim el-bouldan* ; that is, a List or Table of the inhabited parts of the Earth, is an extensive geographical treatise, arranged in the form of tables, as its title imports. The countries, provinces and cities, stand in the order of their respective climates, their longitudes and latitudes are annexed, and the description of every place is accompanied with notes and remarks, which are often very interesting, and which are the more valuable to us, as they afford us the means of comparing the condition of the East, in the time of Aboulfedha, with its present state.

This work of Aboulfedha has been augmented and illustrated by *Mohamed cbn Aly*, surnamed by the Turks *Sipahy-zadeh* ; that is, the son of a soldier. This writer has commented on, and explained many places, and has dedicated the work, under the title of *Ouadheh el-meçalek el-marefat el-boldan ou-el-memalek*, to Sultan Mourad-khan (*Amurath III.*) a prince who patronized learning, and cultivated it himself, having composed several works in the Arabic, Turkish, and Persian languages.

The

works of that prince, who hath rendered such important services to the sciences.

The *Tekouim El-boldan* of Aboulfedha must not be confounded with another work, under the same title, ascribed to *Salhajy*, nor with another geographical treatise, entitled *Tekouim El-belâd*, composed by an Arabian author, cited (under the name of *El-Balkhy*, that is, a native of Balkh, the capital of Khoraçan), by *Ebn-el-ouardy*, in the preface to his *Kheridat El-ajaib*.

The second work of Aboulfedha is entitled *El-Moukh-taffar fy ackhbar El-bachar*, or, an abridged collection of the Histories of the World, and contains a summary of universal and general history, brought down to the age in which the author flourished. The title of Moukhtassar is not peculiar to this work, but is prefixed to a great number of other Arabic books.

The Eulogy of Aboulfedha is to be found in the *Diwan*, or, a collection of the Miscellaneous Works of Mohammed *ebn Mohammed El-Fareky*, commonly known by the name of *Ebn Nobatah*. This collection, entitled *Souk-el-rekik*, is deposited in the National Library at Paris, No. 1450.

Note of Citizen J. J. MARCEL.

REMARKS

On the Use of Oil in the Plague.

By Citizen DESGENETTES, Chief Physician to the Army of the East.

A SERIES of observations and reasonings led George Baldwin, the British Consul at Alexandria, to believe that friction of the bodies of persons exposed to the plague, with lukewarm oil of olives, would be not only a preservative against, but an efficacious mean of removing, that malady. In order to bring his opinion to the test of experiment, he imparted it to Father Louis of Pavia, who had superintended the hospital of Smyrna for seven and twenty years, requesting him to make a trial of this remedy: and that priest observed that, of all the means against the plague, employed under his inspection, this was the most useful.

From the trials made of this remedy, there resulted a series of directions on the manner of administering it, and of the regimen to be observed during the time.

It

It is not sufficient barely to anoint the whole body with oil: it must also be strongly rubbed with it; and hence the word friction has been preferred to unction.

The friction ought to be made with a clean sponge, and a motion so quick, that it may be over in three minutes. It should be made only once, on the day when the disease makes its appearance.

If the perspiration be not abundant, the frictions must be repeated till the patient swims, so to speak, in his sweat; and neither his shirt nor his bed should be changed, till the perspiration cease. This operation should be performed in a close chamber, furnished with a chafing-dish full of live coals, on which sugar or juniper-berries ought, from time to time, to be strewed.

It is impossible to determine the time which should intervene between the frictions, because a second friction cannot be made, till the perspiration has entirely ceased; a circumstance which depends on the constitution of the patient. Before each repetition of the friction with oil, the sweat must be wiped from the patient's body with a warm cloth. These frictions may be continued several days successively, till a favourable change is observed, and then they may

be more slight. It is difficult to determine precisely the quantity of oil necessary for each friction; but a pound should certainly be sufficient; the freshest and purest oil is to be preferred, and it should be rather lukewarm than hot. The breast and the privities should be slightly rubbed; and the parts which are not under friction should be carefully covered, to avoid cold. If there are tumors and bubos, they should be gently anointed, till they are sufficiently ready for the application of emollient cataplasms, to induce suppuration.

The person who performs the frictions should before-hand anoint his body with oil; it is useless for him to rub himself; nor does it signify whether he anoint himself with more or less quickness. It will also be prudent for him to observe the ordinary precautions as to oil-skin or cere-cloth cloaths, wooden-shoes, &c. to avoid the breath of the patient, and above all, to preserve a great deal of courage and coolness.

We cannot too much recommend, that the frictions be not delayed after the disease makes its appearance. The perspirations are very much promoted by giving the patient an infusion of the flowers of the alder-tree, without any sugar.

As to regimen, the patient may be supported, for

for the first four or five days, with a soup of vermicelli, well boiled in water alone, without salt. Afterwards a small spoonful of cherries preserved in sugar, may be additionally given him six or seven times a day ; for it is to be feared that honey would be too laxative.

When there are hopes of a cure, that is, when, after five or six days, the patient finds himself better, he may be allowed in the morning a cup of good Mocha coffee, and a sugared biscuit, and the number of biscuits may be increased, as he recovers his strength.

For fifteen or twenty days, the patient should dine and sup on rice or vermicelli, boiled in water alone, a little bread, dried raisins and preserved cherries, in greater plenty than before ; and the quantity of bread, which ought to be of the best quality, may be increased. In summer, his soup may be made of little gourds (*courges*), and in winter of pot-herbs, with no other seasoning than a little oil of sweet almonds. In the course of the day, according to the state of the convalescent, oranges, very ripe or baked pears, or even biscuits, may be given him, in such quantity, that digestion may be easily carried on, and his appetite never wholly satisfied. At the end of thirty or even five-and-thirty days,

his

his morning and evening repasts may consist of soup made of chicken, or a neck of mutton; but he should not be allowed to use solid meat, before the expiration of forty days, in order to avoid indigestion, which is dangerous, and frequently accompanied with the return of buboes.

After the fortieth day, he may eat roasted or boiled veal, and may take a moderate quantity of wine; but should carefully avoid every thing which is of difficult digestion.

The following are some proofs of the efficacy of oil:—

In one year, in which the plague carried off a million of people in Upper and Lower Egypt, there was not a single instance of an oil-porter being attacked with that malady: * The same observation was made at Tunis; and these facts first suggested the idea of employing oil, both as a preservative and as a remedy.

In 1793, two-and-twenty Venetian sailors lived on a low swamp, for the space of five-and-twenty days, with three persons who died of the

* The Translator has been informed that, when the plague raged in London, the tallow-chandlers generally, or universally, escaped infection. The tobacconists are said to have been equally fortunate.

plague ; but unction with oil saved all the rest of the party.

In the same year, three Armenian families, one of them consisting of thirteen individuals, another of eleven, and the third of nine, saved themselves by the same means. They attended their infected parents, lay on the same beds, and might be said to hold them incessantly in their arms ; yet they escaped the contagion.

In 1794, a poor woman was shut up in a chamber with thirteen persons, infected with the plague, of whom she had the care, and by means of unction, she preserved herself from the contagion.

Two persons belonging to a family of Ragusa, caught the infection in the last mentioned year. They plunged themselves, so to speak, into oil, and were exempted from all harm.

In short this practice is at present approved, and generally followed at Smyrna.

In the course of these observations, we find several admonitions ; particularly on the necessity of immediately administering the frictions to the infected. A delay of five or six days would render them wholly ineffectual.

A diarrhoea is regarded as a mortal symptom : the frictions however ought not to be discontinued

tinued on that account; for four patients, who had arrived at that dangerous crisis, were nevertheless cured.

The hospital at Smyrna received, in five years, two hundred and fifty infected patients; and it may be safely affirmed that every one of them, who were allowed proper time, and submitted to the above treatment, obtained a cure.

An immense number have been preserved from contagion by unction, assisted by temperance.

The little work, of which the present is an abstract, is concluded by the favourable attestations of the Consuls of England, and the empire, at Smyrna; and a number of testimonies of persons in public employments, and of respectable individuals, who have endeavoured to extend this method of treatment into every country interested in it.

We have omitted nothing essential, and disregarding all theory, we only present facts, already supported by numerous testimonies, and which we submit anew to the test of experiment.

REPORT

Of the Observations made to determine the Geographical Position of Alexandria, and the Direction of the Magnetic Needle,

By Citizen NOUET.

I CARRIED with me from Paris an astronomical circle, with two moveable telescopes, and a marine watch made by Louis Berthoud. Citizen Quenot was furnished with a circle of reflection* and a marine watch. We distinguished

* The circle of reflection here mentioned, if divided into reflected degrees, to answer as a double sextant, is the invention of that excellent mathematician, Captain P. R. Nugent, for which he took out a patent in London, seven years ago. But the invention having been pirated by the man employed to divide the arch, it was carried abroad in a redundant and imperfect state, and used in the cumbrous form of a circle. The Translator, however, has seen a compleat one in possession of Mr. A. Tilloch. Its radius is ten inches, and it has a reflected cross artificial horizon, by which altitudes can at all times be correctly taken on shore, and also at sea in bad weather. About two years ago, Captain Nugent also lodged in the Enrolment-office, an extensive

ed the two watches, calling the first No. 34, and the second No. 19. Before my departure, I had occasion to regulate the movement of No. 34, for about fifteen days, by comparing it every day at noon, with the pendulum clock of the marine observatory, and thence deducing its diurnal acceleration of 12", mean time.

During the journey, I could not keep this watch suspended in its box; I carried it in a waistcoat pocket, in a position always vertical, and with the point of noon uppermost, as the maker had advised me. We took Marseilles in our way, in order to regulate the movement of our watches, at the marine observatory of that city; and, having compared them, on the 15th of Floreal, with the pendulum clock in the observatory, the movement of No. 19 was found to be very little altered; but No. 34 had gained, since our departure from Paris, 2" of diurnal acceleration: whence I concluded that this watch would be useless in journeys by land.

tensive specification of some new, and improved, astronomical and magnetical instruments, among which were variation and dipping compasses and needles, of precisely the same construction with those afterwards mentioned in this report, and several which possess essential advantages incompatible with those constructions.—*Translator.*

Having

Having reached Toulon, I put my watch, No. 34, in its box or case, and, during our short stay in that town, and on the road, we made observations to determine anew the movement of this watch ; and we found that, from the 18th to the 27th of Floreal, its movement had returned to $10''$ of acceleration.

On the 27th Prairial, we had a very favourable opportunity of regulating our watches, at the observatory of Malta. During our passage from Toulon to that island, No. 34 had a daily acceleration of $11'',5$, and No. 19 of $5'',7$, being pretty nearly their ordinary movement.

On the 14th of Messidor, at the anchorage near the tower of Marabou (Marabout) citizen Quenot, from the absolute altitudes of the sun taken with his circle, found, by his watch, the longitude of Alexandria to be $1^h\ 50' 17''$. This observation, compared with No. 34, gave, for the longitude of Alexandria $1^h\ 50' 56''$, allowing for the daily acceleration of $11\frac{1}{2}''$ found at Malta. But this watch was probably influenced by the temperature, as the subsequent observations proved. For, in the first days of Thermidor, we had obtained, by observations daily made on shore, $7'',5$ of diurnal acceleration ; but at Malta we had $11'',5$: taking therefore the mean of the

two results, we had $9''\frac{1}{2}$ of advance upon the mean time. If we multiply $9'',5$ by 27, the days intervening between the 27th Prairial and the 14th of Messidor, we shall have $2'41'',5$, instead of $3'15'',5$ employed above. With this new acceleration we found, by No. 34, for the longitude of the anchoring place, $1^h 49' 40''$ the distance of the Aquillon from the tower of Marabou, being estimated at 6000 metres.

The Pharos was 50 degrees to the south-east of us, and the distance from the anchoring place to the meridian of the Pharos, according to the plan of Alexandria, was 14,600 metres. This distance, reduced into longitude, for the latitude of $31^{\circ}12'$, gives $38''$ in time, for the difference of meridians between the anchorage and the Pharos. But, by No. 34, we found the longitude of the anchoring place of the Aquillon, $1^h 49' 40''$. If to this we add $38''$, because we were situated to the westward, we shall have, for the longitude of the Pharos of

Alexandria,	-	-	$1^h 50' 18''$
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By No. 19 we found it		$1 50 17$
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Citizen Quenot, from 42 observations of the eastern and western distances of the moon from the sun, in which the errors of the theory ought to balance each other, found the longitude of Alexandria

Alexandria to be $1^{\text{h}} 50' 20''$. Thus the three different results vary only $3''$, and consequently appear to merit confidence.

Let us now see what results were afforded by the celestial phenomena.

On the 24th of Messidor, the immersion of the first satellite of Jupiter, gave, for the difference of meridians, $1^{\text{h}} 50' 56''$.

On the 8th of Thermidor, the immersion of Jupiter's second satellite, gave, for the difference of meridians, $1^{\text{h}} 50' 23''$. Slight clouds were passing during the observation.

Idem. The emersion of the second satellite of Jupiter, gives, for the difference of meridians, $1^{\text{h}} 51' 18''$. The path of the Satellite was near the edge of Jupiter's disk.

On the 20th Thermidor, the immersion of Jupiter's third satellite, gave, for the difference of meridians, $1^{\text{h}} 51' 7''$.

On the 3d Fructidor, there was an immersion of the second satellite of Jupiter; but it was not distinctly perceived, by reason of a small cloud: the observation is therefore doubtful.

Idem. The immersion of the first satellite of Jupiter, gave, for the difference of meridians, $1^{\text{h}} 50' 44''$.

On the 10th Fructidor, the immersion of the

first satellite of Jupiter, gave, for the difference of meridians, $1^h 50' 17''$. Jupiter was near the zenith, the instrument could scarcely reach it, and the image of the object was formed on the edge of the field of the telescope.

On the 15th Fructidor, there was an immersion of the second satellite of Jupiter, which gave, for the difference of meridians, $1^h 51' 4''$. The wind shook the telescope.

Among all these observations, we chose the four following, viz.

The 24th Messidor, which gives $1^h 50' 56''$

The 8th Thermidor, which gives $1 \ 50 \ 23$

The 3d Fructidor, which gives $1 \ 50 \ 40$

The 15th Fructidor, which gives $1 \ 51 \ 4$

The mean of all - $1 \ 50 \ 46$

These observations, to merit confidence, should be confirmed by corresponding ones, made in observatories, whose geographical position is well established, and the error of the theory thence deduced. But we may for the present, look upon the determination of the longitude of Alexandria, deduced from the motion of marine time-pieces, and the obscured distances of the moon from the sun, as exact.

The

The 3d Fructidor afforded us a decisive observation, for fixing the geographical position of Alexandria, by means of an occultation of the star ϕ of Sagittarius, by the body of the moon; but, for once, the sky was so entirely obscured by clouds, as to deprive us of the benefit of this phœnomenon: At half past nine o'clock, the clouds were dissipated, and we endeavoured to observe the immersion; but, as we were ignorant of the instant of immersion, we sat down too soon at the telescope. After continuing our observation half an hour, I traced the whole limb of the moon, to see if the star had not escaped us, and, at the moment when I returned to the point which I had watched so long, I perceived that the emersion had already taken place about 6" of time. This observation being uncertain, I made no use of it.

To determine the latitude of Alexandria, we made use of a quadrant of 13 inches radius, constructed by citizen Lenoir, maker of astronomical instruments. There was adapted to the moveable telescope a metal mirror, to reflect the image of the object perpendicularly to the axis of the telescope, a construction which is necessary in climates where the sun approaches the zenith.

The results which we obtained were nine in number, viz.

$31^{\circ} 11' 54''$	In these observations allowance was made for half the thickness of the thread . . . — $15''$ For refraction . . . — $18''$ For the error of the telescope + $2' 0''$
11 57	
12 6	
12 11	
12 12	
12 20	
12 28	
12 28	
12 32	

$110^{\circ} 8$

$13^{\circ} 12' 14''$

This latitude was observed on the terrace of the Batavian Consul; but, according to the plan of Alexandria, the distance of this place of observation from the perpendicular axis of the Pharos, is 1583 metres, which, reduced to parts of the meridian, gives $51''$, to be added to $31^{\circ} 12' 14''$, in order to obtain the latitude of the Pharos $31^{\circ} 13' 5''$.

*The Variation and Dip of the Magnetic Needle,
observed at the Flag-staff of the Commandant
of Engineers.*

These observations were preceded by some preliminary ones, to determine the direction of a point of the horizon, in respect of the north and south points of the world. We gave the preference to the Pharos, because it was our standard for regulating the triangles which adjust the principal points of the plan of Alexandria.

On the 21st, 22d, and 23d of Thermidor, we observed, with the astronomical circle, eight azimuthal differences between the Pharos and the centre of the sun. Some instants after sun-rise, these differences of azimuth, each composed of two conjoined angles reduced to the horizon, gave the angles at the zenith, between the verticals of the Pharos and the Sun, which being combined with the azimuths of the sun, calculated for the same instant, gave, for the azimuth of the Pharos, the eight following results :

$12^{\circ} 59' 52''$ West.

13	0	12
12	58	31
12	58	14
13	2	20
12	59	6
12	59	6
12	59	6

The mean, $12^{\circ} 59' 33''$ West.

The compass which we used was 21 centimetres in diameter, carrying on its centre a needle in the form of a parallelogram, 18 centimetres and a half in length, armed in the middle with a cap of agate, moveable on two pivots, to adjust the needle by vibration.

This compass was concentric to a circle, in which it moved like an index; and, by means of a Vernier, indicated on the circle the different successive arches which it described. To multiply observations, on the different points of the circumference of the exterior circle, the zero of the compass was made to coincide with the index of the needle, at the same time that the Vernier of the compass coincided with the zero of the exterior circle; the compass was then moved (the exterior circle remaining fixed) till its

its zero corresponded with the object, in the horizon, whose azimuth was known. This correspondence was indicated by a meridian telescope, which moved in the meridian of the compass, adjusted by vibration.

We determined the difference of azimuth, between the Pharos and the little Pharos (*Pharillon*) in order to obtain the azimuth of the latter, from which we deduced the variation of the needle. If we had made the Pharos our object, it would only have given us an angle of 6' and a half with the direction of the needle.

There is annexed a table of multiple observations, made on two immediately succeeding days; and we have carried them to two compleat revolutions of the exterior circle, in order to correct the errors unavoidable in dividing instruments of so small a radius.

The first column contains the arches of the difference of azimuth indicated on the interior circle of the compass. All the arches are reckoned from the zero point of the compass, and are always indicated by the same portion of the circumference. Thus the variations observable in them arise partly from the *inertia* of the needle, or from the friction on its pivot.

The second column contains the multiple angles

gles given on the exterior circle, and the third column exhibits the quotients of the angles of the second, divided by the number of observations. The first day affords us for the ultimate result, $55^{\circ} 56' \frac{1}{2}$ between the *Pharillon* and the direction of the needle; the second day gives us $55^{\circ} 57'$; but the azimuth of the *Pharillon* has been found to be $42^{\circ} 51'$ north-east; therefore the variation of the compass is $13^{\circ} 6'$ west.

Observations on the Dipping Needle, and on the Time which it takes to describe given Arches, in Proportion to the local Force of Magnetism which affects it.

These observations were made with a dipping compass, consisting of a vertical circle, moveable in an azimuthal one, and carrying on its centre a round needle, ending in two points. It was 16 centimetres and a half in length, and moved in the plain of the vertical circle, by means of two pivots which rested on two edges of agate.

To give the needle a great motion, the vertical circle which supports it must be carried about 90° to the right and to the left of the magnetic meridian, and immediately brought under

under the meridian indicated by the antecedent observations on the azimuthal circle.

I began to count when the oscillations reached no farther than the zero of the vertical circle, which is the zero of the dip, and which gave 46 or 47 degrees for the half of the greatest arches described, and every fifth time that the needle stopped on the right, or was at the zero of the dip, the time employed, and the degree which the needle had reached, were marked. This process was continued every fifth time, to the point nearest the point of rest, which gave at each trial, the angle of the dip. We made our experiments with the face of the limb turned towards the east, and then towards the west, in order to correct the error of the zero point with the true horizon. I subjoin two tables of these observations. Each is composed of six columns, which represent six different experiments, in order to obtain the mean of their results. Every column is divided into four other columns; the first indicates the minute and second of each observation; the second column, which contains the differences of the times of the first column, gives the number of seconds which elapsed during each observation; the third includes, in degrees, the limit of every twelfth oscillation;

and

and the fourth column exhibits the magnitude of the half arches described in every ten oscillations.

We see that the greatest arches were described in $28''$; the mean in 31 and $32''$, and the least in $25''$. This table wants the support of corresponding experiments, made in different climates, to obtain the results of the force of magnetism. The dip of the needle is noted at the foot of each column. A difference will be observed in the two tables: the first gives the dip $46^{\circ} 10'$, with the face of the limb presented to the east, and the second $48^{\circ} 50'$, the face of the limb being directed towards the west. The half of this difference is owing to the error of the zero point with the true horizon, indicated by a level, fixed upon a glass-case, which defends the needle from the agitations of the atmosphere. Hence the reason why the observations are made to correspond. The mean of them gives the dip of the needle $47^{\circ} 30'$ beneath the northern part of the horizon.

I was advised, and it was my wish, to make similar observations on the oscillation of the variation needle; but the manner of its suspension with a cap does not allow it to make a number of

of horizontal oscillations, to repeat the observations twice. There is scarcely any other compass than that of citizen Coulomb, in which the needle is suspended by a thread, from which we can expect satisfactory results.

Observations on the Variation of the Compass at Alexandria.

Simple interior arches.	Multiple exterior arches.	Simple angles deduced.	Simple interior arches.	Multiple exterior arches.	Simple angles deduced.
56° 5'	56° 0'	56° 0'	55° 58'	55° 58'	55° 58'
55 50	111 50	55 55	56 0	111 55	55 57
55 30	167 18	55 44	55 30	167 4	55 41
55 15	222 28	55 37	55 37	222 15	55 34
55 45	278 15	55 39	55 55	278 13	55 39
55 30	333 45	55 38	55 45	333 48	35 38
55 45	389 40	55 40	55 45	389 45	55 41
55 15	445 52	55 44	56 12	445 55	55 44
56 0	501 48	55 44	55 45	501 48	55 45
56 20	558 0	55 48	56 30	558 5	55 48
56 30	614 30	55 52	56 30	614 30	55 53
56 5	670 25	55 52	56 10	670 35	55 53
56 45	727 15	55 56,5	56 45	727 20	55 57

Note. In order to compensate the errors of division, the observations were continued to 727 degrees, which complete two circumferences.

Last result of the multiple angles between the

direction of the needle and the Pharillon 55° 57'

Azimuth of the Pharillon - - - 42 51 N.E.

Difference, or variation of the compass 13 6 W.

Observations on the Dipping Compass, the Face of the Limb being towards the East.

Times observed.	Differences.	Limits of oscill.	Arches describ-ed.	Time observed.	Differences.	Limits of oscill.	Arches describ-ed.
55' 2"	28"	0°	46°	7' 8"	29"	0°	46°
30	28	8	38	37	28	8	38
59,5	29	13	33	8 5	28	12	34
56 27	28	17	29	33	28	17	29
55	28	21	25	9 1	28	20	26
57 23	28	25	21	29	28	23	23
51,5	28	27	19	57	30	26	20
58 21	30	30	16	10 27	29	29	17
52	31	32	14	56	31	31	15
59 23	31	34	12	11 27	30	33	13
54,5	31,5	36	10	57	31	35	11
0 26	31,5	38	8	12 28	30	37	9
57	31	40	6	58	30	38	8
1 27	30	41	5	13 28	29	40	6
57	30	42	4	57	29	41	5
2 27	30	43	3	14 26	27	42	4
54	27	43,5	2,5	53	27	43	3
3 20	26	44,5	1,5	15 20	24	44	2
45	25	45	1	44	22	44,5	1,5
4 8	23	45,3	0,7	16 6	22	44,7	0,8
Reft.		46		28	19	45	
				15 47		46,3	
				Reft.		46,5	

Times observed.	Differences.	Limits of oscill.	Arches describ-ed.	Times observed.	Differences.	Limits of oscill.	Arches describ-ed.
24' 14"	1°	46°	39' 43"	29"	0°	46°	
43	29"	8	39	40 12	29"	7 $\frac{1}{2}$	39
25 11	28	13	34	39	27	13	33
40	29	17	30	41 7	28	17	29
26 7	27	21	26	35	28	21	25
	28	24	23	42 3	28	24	22
	35	28	27	20	31	27	19
	32	29	30	17	43 0	29	18
28 2	30	32	15	30	30	31	15
	30	33	14	44 2	32	33	13
29' 2	30	35	12	33	31	35	11
	33	35	10	45 3	30	37	9
30 5	30	39	8	33	30	38	8
	30	40	7	46 3	30	40	6
31 5	30	41	6	32	29	41	5
	29	43	4	47 1	29	42	4
32 3	29	43,5	3,5	29	28	43	3
	27	44	3	57	28	43 $\frac{1}{2}$	2,5
56	26	45	2	48 23	26	44	1
33 21	25	46	1	48	25	45	1
48	27	46,5	0,5	49 11	23	45,0	
Rest.		47		32	21	45,5	
				53	21	45,7	
				Rest.		46,3	

Times observed.	Differences.	Limits of oscill.	Arches describ-ed.	Times observed.	Differences.	Limits of oscill.	Arches describ-ed.
57' 53"		1°	45°	9' 34"		1°	45°
58 22	29"	7½	39	10 3	29"	7½	39
51	29	13	33	92	29	13	33
59 18	27	17	29	11 0	28	17	29
45	27	20	26	11 28	28	20	26
0 14	29	23	23	55	27	24	22
42	28	26	20	12 24	29	26	20
1 11	29	29	17	53	29	29	17
41	30	31	15	13 23	30	31	15
2 12	31	33	13	53	30	33	13
42	30	35	11	14 24	31	35	11
3 14	32	36	10	55	31	37	9
43	29	38	8	15 25	30	38	8
4 12	29	39½	7	5	28	39	7
41	29	40½	6	16 20	27	41	5
5 8	27	42	4	47	27	41½	4,5
34	26	42½	3,5	17 13	26	42	4
59	25	43	3	39	26	43	3
6 23	24	44	2	18 4	25	43,7	2,3
44	21	44,5	1,5	29	25	44,3	1,7
7 5	21	45	1	55	26	45	1,0
23	18	45,3	0,7	19 20	27	45,3	0,7
42	19	45,7	0,3	52	30	45,5	0,5
Reft.		46		Reft.		46	

*Continuation of Observations on the Dipping Compass,
the Face of the Limb being turned towards the West.*

Times observed.	Differences.	Limits of oscill.	Half-arches describ-ed.	Times obſerved.	Differences.	Limits of oscill.	Half-arches describ-ed.
7' 20"	0 ^o	49 ^o	18' 6"	18' 6"	29 ["]	0 ^o	48 ^o
49	29 ["]	7	42	35	28	7	41
8 17	28	13	36	19 3	27	13	35
45	28	17	32	30	28	17	31
2	27	20	29	58	28	21	27
40	28	24	25	20 26	28	24	24
10 8	23	26	23	56	30	27	21
36	28	29	20	21 26	30	29	19
11 6	30	31	18	56	30	33	16
37	31	33	16	22 27	31	35	13
12 9	32	35	14	58	31	37	11
36	27	41	8	23 29	31	39	9
13 3	27	42,5	6,2	24 0	31	40,5	8
30	27	44	5	32	32	42,5	6
57	27	45	4	25 2	30	44	4
14 21	24	46	3	29	27	45,3	3
41	20	47	2	56	27	46,3	2
58	17	47,5	1,5	26 19	23	47,3	1
15 13	15	47,7	1,0	42	23	47,7	0,7
Rest.		48,7		27 15	23	48	0,5
				Rest.		48,5	

Times observed.	Differences.	Limits of oscill.	Half-arches describ-ed.	Times observed.	Differences.	Limits of oscill.	Half-arches describ-ed.
52' 49"	29"	0°	48°	2' 17"	29"	0°	49°
53 18	29"	7	41	46	28	6,5	42,8
57	29	15	33	3 14	28	11	38
54 24	27	19	29	42	28	15,5	34
52	28	23	25	4 10	28	19	30
55 21	29	27	21	38	28	22,5	27
50	29	30	18	5 6	28	25,5	24
56 19	29	32	16	34	28	28	21
47	28	34	14	6 4	30	31	18
57 15	28	36	12	34	30	34	15
42	27	37,5	11,5	7 3	29	37	12
58 8,	26	39	9	33	30	39	10
34	26	40,5	7,2	8 0	27	41	8
58	24	43	4,7	27	27	43½	6
59 21	23	45,7	2	55	28	45	4
44	23	46,5	1,2	6 23	28	46	3
0 8	24	47	0,7	51	28	47	2
Rest.		47,7		10 15	24	48	1
				37	22	48,3	
				Rest.		49,3	

Times observed.	Differences.	Limits of oscill.	Half-arches describ-ed	Times observed.	Differences.	Limits of oscill.	Half-arches describ-ed.
13' 28"	18	48°	48°	24' 19"	29"	0°	49,° 3
14 17	29"	7,7	40,3	48	28	6,5	428
45	28	13,3	35	25 16	28	14	35,3
15 12	27	17 1/2	30,5	44	28	16	33,3
41	29	21	27	26 12	28	19,5	29,8
16 9	28	23,7	24	40	28	23	26,3
38	29	27	21	27 9	29	26,5	22,8
17 7	29	29,5	18,5	39	30	28	21,3
38	31	31,7	16,3	28 9	30	30,5	18,8
18 19	31	34	14	40	31	32,7	16,6
40	31	36,3	11,7	29 11	31	35	14,3
19 12	32	38,3	9,7	42	31	37	12,3
44	32	40	8	30 11	29	39	10,3
20 16	32	41,5	6,8	40	29	40,5	8,8
47	31	43	5,3	31 8	28	42	6,3
21 17	30	43,7	4,6	36	28	43,3	6
48	30	44,5	3,8	32 2	26	44,3	5
22 18	30	46,7	1,6	28	26	45,3	4
40	22	47,3	1	53	25	46	3,3
23 1	21	47,7	0,6	33 17	24	47	2,3
21	20	48	0,3	41	24	47,5	1,8
Rest.		48,3		34 4	23	48	1,3
				Rest.		49,3	

The first column marks the time at which each tenth oscillation ended.

The second column expresses the time employed in making ten oscillations.

The third column marks the limit or term of every tenth oscillation.

The fourth column contains the magnitudes of the half arches described in every ten oscillations.

The dip deduced from the last results of every column, the face of the limb being,

Towards the East. Towards the West.

46° 0'

48° 45'

46 30

48 30

46 15

49 20

46 0

48 15

46 10

49 20

46 10

48 50

48 50

Mean, 47° 30'

Analysis of the Slime of the Nile,

By Citizen REGNAULT.

THE influence of the slime, or mud, of the Nile, and its uses in the arts, have induced me to subject it to chemical analysis.

After the annual inundation, the soil of Egypt is covered with a stratum of slime more or less thick. Its colour, at first black, is changed by the desiccation of the air, into a yellowish brown. It then cracks, and presents fractures, which shew that the slime has been deposited in horizontal layers, the ordinary disposition of clay, of which it possesses the other characters. It has a strong affinity for water, and suffers contraction in the fire.

On washing the slime, only a small quantity of salts is obtained; for 100 parts of slime contain but 1'2. These salts are composed of muriate of soda, sulphate of soda, and carbonate of ammoniac.

The slime dried in the air, and finely pulverized, yields by distillation, carbonic acid and water, the last in the proportion of 11 parts in 100. It then puts on a black colour; but if, in this

this state, it be heated in a crucible, in contact with the air, it becomes red, and loses the eleventh part of its weight. Presuming that this loss of weight, joined to the change of colour, was owing to the combustion of the carbonic part, I distilled the slime with nitrate of pot-ash; and the quantity of carbonic acid disengaged by this operation, left me not a doubt of the existence of carbon in the proportion indicated.

The slime subjected to these operations, was taken up at the distance of 500 toises (fathoms) from the Nile, in a canal serving to conduct the waters of the inundation; it was dried in the air.

One hundred parts by weight, of this slime, heated in a silver crucible, with 300 parts of caustic pot-ash, yielded a green mass, which was almost entirely dissolved by the muriatic acid. Some white flakes remained in the liquor, from which four grains of filex were separated by filtration.

The muriatic solution, being divided into two equal parts, the one was decomposed by ammoniac, and the other by carbonate of pot-ash.

The precipitate formed by the ammoniac was composed of alumine and iron. There could be

no magnesia in it; for the muriatic solution held an excess of acid, and this excess, in uniting itself with the alkali, had formed muriate of ammoniac, which had given, with the muriate of magnesia, a triple salt not decomposable by a greater quantity of the same alkali. To separate the iron from the alumine, I dissolved this earth in a solution of caustic pot-ash; and, on doubling the quantities, found,

Oxyd of iron 6 parts,
Alumine—48.

Before decomposing the other portion of the solution of slime, it was deprived of the excess of acid. The precipitate obtained by the carbonate of pot-ash was exposed to a strong heat in a crucible (*tet à rotir*) in order to oxydate the iron, and to prevent it, as well as the alumine, from being affected by the acetous acid. This acid, kept in digestion on the precipitate, formed, with the lime of the magnesia, salts which, when separated and converted into carbonates, gave, by doubling the quantities,

Carbonate of lime—18 parts,
Carbonate of magnesia 4.

Thus, in 100 parts, the slime of the Nile contains

11 of water,
9 of carbon,
6 of oxyd of iron,
4 of filex,
4 of carbonate of magnesia,
18 of carbonate of lime,
48 of alumine.

Total 100 parts.

It must be observed, that the quantities of filex and alumine vary, according to the places where the slime is taken up. On the banks of the Nile, the slime contains a great quantity of sand, and as it is carried by the waters of the inundation, to distant grounds, it loses a portion of sand proportionable to its distance from the river ; so that, when this distance is considerable, the argil is found almost pure ; and thus the soil of Egypt presents clay in the different states of purity required in the arts.

We find, in the slime of the Nile, the principles which promote vegetation. The cultivators of the soil look upon it as a sufficient manure ; and so much are they convinced of this, that, when the land stands in need of manure, they cover it with the slime of the Nile, reserving their stable dung for other purposes : for exam-

ple, they dry it, and burn it instead of fire-wood, which is scarce in Egypt.

Prosper Alpinus justifies this opinion; for, when speaking of the slime, he says, *Agri ita pinguefiunt, ut stercoretione non egeant.* (The land is so rich, that it requires no dung.) We adopt the same opinion; for if the slow progress of vegetation, observable in some parts of Egypt, were to be urged as an objection against it, we might fairly ask, Whether that slow progress should be ascribed to the want of manure, or of proper culture?

The slime of the Nile is employed in several arts. Excellent bricks, and vases of different forms, are made of it. The same material enters into the composition of pipes. Glass-makers use it in constructing their furnaces, and the country people cover their houses with it. We hope that, when the qualities of the slime come to be better known, it will be applied to more valuable purposes, such as delft-ware and porcelain; and these arts, if introduced into Egypt, would contribute to the prosperity of the new colony.

Remarks on the Management and Produce of the Land, in the Province of Damietta,

By Citizen GIRARD.

THE rice of the province of Damietta, being in more estimation than that of any other part of Egypt, I thought I should be usefully employed, during my stay, in collecting all the information I could procure, on the management of the land proper for the cultivation of that grain, and on the commerce carried on in it, to Syria, and the other countries of the East.

To arrive at results rigorously exact, in the researches which I proposed to make, would have required the experience of several years; consequently I can only present these remarks as the first sketch of a more perfect work, which time alone can furnish the means of executing.

It will be proper, in the first place, to settle the proportion of the measures of superficies and capacity, used in the province of Damietta, to our own corresponding measures.

The cultivators commonly measure their lands by the number of wheels necessary to raise the water

water designed to irrigate them, or by the number of days employed in cultivating them. But this way of measuring, having nothing determinate, is not admitted into the public acts.

The standard or root (*unité*) of superficial measure is called a *fedan*, which is a surface of 432 square rods (*cannes*). The rod is 3 metres, 99 centimetres in length. Thus the fedan is equivalent to 6877 square metres, 48 centimetres, which makes two *arpents* and one-hundredth, Paris measure *.

In general all dry grain is weighed. The *okka*, which is the standard of the weight, appears to be variable, in different divisions of Egypt. At Damietta, it consists of 400 drachms, which make two pounds and a half avoirdupois.

But for weighing those kinds of grain which are most consumed, such as rice, wheat, barley and

* The metre (from *metron*, the Greek word for measure) is 36 inches, 11,296 lines, and the centimetre and the millimetre, one-hundredth and one-thousandth of the metre, respectively, as their names import. See De la Lande's History of Astronomy for 1799, in Tilloch's Philosophical Magazine. The Paris *arpent* contains 100 square perches, each perch 18 feet. The fedan appears to be to the English acre as 74 to 43, in round numbers. Those who would make the calculation with nicety, must observe that the French foot is to the English as 1068 to 1000. *Translator,*

maize (or Indian corn), they use a more considerable weight, called *ardeb*, which is equivalent to 225 okkas, or to 578 pounds, and twenty-three hundredths.

By a very remarkable practice, for which it is difficult to account, the weight of rice, before it is freed from its husks, is not estimated in ardebs, as it is after being cleansed and ready for the market, but by a weight of another standard, called *dareb*, which is equivalent to 448 okkas, or 1131 pounds and forty-two-hundredths.

Besides, the measures which we have been describing, vary in the different cantons of Egypt; and the uniformity to which we can now reduce them, is a benefit of which it is to be wished we could procure the immediate enjoyment, to that country.

The land in the province of Damietta is in general proper for the culture of rice. The situation of this province, at the efflux of the Nile, renders its irrigation the more easy, as the level of the soil is less elevated above the waters of the river, and as this level only varies about a metre and a half. It is to be observed, however, that all the lands are not equally elevated. It is not uncommon to see a field higher, by a foot or 18 inches, than those by which it is surrounded.

This

This height, which cannot be attributed to the successive depositions of the Nile, arises from the slime being annually taken out of the neighbouring canals and ditches, and uniformly spread on the surface of the lands now spoken of. Whatever be the cause of this difference of elevation, their culture is not altogether the same with that of the low lands ; for, as soon as the rice is gathered in, they sow on the latter the trefoil, known by the name of Egyptian trefoil, while the former are commonly sowed with wheat.

As the culture of rice, on the more elevated lands, requires considerable expence in irrigation, individuals who cannot afford that expence, substitute for it a crop of maize, which requires to be watered only five or six times during its growth.

To these different articles of culture, must be added sugar canes, and several kinds of pulse, to which they allot some portions of land in the neighbourhood of Damietta ; but it is difficult to estimate the value of such produce, because it depends wholly on the industry of the cultivator, and of the more or less considerable advances, which he is in a condition to make.

Although the northern extremity of the Delta appears to be the least proper part of Egypt, for the

the production of the sugar cane, yet it has been cultivated there with abundant success. There were at Damietta three works in which molasses were made; but the waters of the sea having ascended in the Nile, above the village of Farescour, irrigation could only be performed with brackish water, which destroyed vegetation, and which, impregnating the soil with too much salt, reduced into a state of comparative sterility, the fields which were moistened with it. This calamity, which the province of Damietta long laboured under, only ceased three years ago. On the cause which produced it, there is but one opinion. The canal of Menouf, which branches off from the Nile, near the village of Matarieh, having been considerably enlarged, the waters of the Nile ran into it; and, after traversing the Delta, discharged themselves into the western stream of that river. This derivation so much reduced the branch of Damietta, and the velocity of the waters which continued to flow in it was so much diminished, that, except above Farescour, they could not preserve an equilibrium with the waters of the sea, which the reflux and the north wind tended to drive into the bed of the Nile.

The canal of Menouf having been stopped up by a dyke, or bank, the waters have resumed

their

their former course, in the eastern branch of the river, and now the salt water does not even reach Lefbeh.

In order to give determinate ideas on the subject, I shall reduce the information which I have collected, to a certain number of fedans; and, as the expences of the cultivator are much the greatest, in proportion to his profits, on a small piece of land, I shall take ten fedans* for the term of comparison.

The expences necessary for the cultivation of such a tract of ground are,

1st. The interest of the sums advanced for the purchase of cattle and implements of husbandry, to which must be added the annual chance of loss of cattle.

2dly. The purchase and maintenance of cattle.

3dly. The purchase and wear and tear of machinery and instruments of husbandry.

4thly. The wages and salaries of the labourers employed.

5thly, and lastly, The purchase of seed.

The interest of money, as is well known, is more or less considerable in proportion as the commodity is more or less scarce; and, what is

* Somewhat above 17 English acres. *Translator.*

of still more consequence, in proportion as the property of its possessor is less or more secure. These two causes have probably concurred in Egypt, to raise interest to the rate of ten per cent. The gain of lenders here, as every where else, has no other limits than the necessities, more or less pressing, of borrowers; but in general the interest of money is looked upon as usurious, when carried beyond a tenth part of the loan.

For the cultivation of ten fedans, it is common to employ twelve oxen, the mean price of which is 720 *pataques*.

	<i>Pataques.</i>
The annual interest of this sum is	72
The irrigation of ten fedans requires three wheels to raise the water. These machines, the price of which varies with their magnitude, will cost at a medium, 90 pataques.	
On account of their careless construction, they must be renewed every five years, by which dividing the value of the machines, we have for their annual expence	18
To this must be added the interest of their costs	—
The chief instruments of husbandry, consisting	9

Pataques.

Brought over	99
sisting of two ploughs and a machine to beat the rice, are worth, in the whole, 30 pata- ques, the annual interest of which is	3

Their wear and tear may be valued at the same sum of	—	—	3
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As the cultivators in the vicinity of Da- mietta raise no cattle, the chances of their sickness and mortality are not balanced by any presumed benefits. These chances may be estimated at one-twelfth part of the num- ber of oxen employed, which, for the culti- vation of ten fedans is	—	—	60
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The oxen are fed, for four months, on beans and cut straw.			
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The value of the straw, in common years, is	—	—	—	75
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That of the beans is	—	—	—	100
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During five other months, the oxen are fed with green trefoil, valued at	—	—	200
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During the three remaining months, they are fed with dried trefoil, the produce of 9 fedans of land, and which, at the rate of 12 pataques per fedan, produces an expence of	108
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Two	—
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Carry over	648
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	Pataques.
Brought over	648
Two men to take care of the cattle, paid each at the rate of 300 <i>paras</i> the month	
cost annually	— — — 80
Three other men, also employed, during the whole year, in working the machines for raising the water, and in other day labour. They are paid 9 <i>paras</i> per day, making yearly, for the three	— — 108
The cultivators employ besides, an overseer to whom they commonly give yearly	72
Total	908

Which sum of 908 pataques is independent of the management of the rice fields.

I shall suppose that the ten fedans, after the rice is taken off the ground, are sowed with trefoil or wheat, &c. and I shall compare the produce arising from these two modes of management.

The rice is sown in the month of Germinal. Before it is committed to the soil, it is steeped five or six days, in boxes immersed in the Nile, or the canals which branch from it. When it is sufficiently softened by the water, it is spread on mats, formed into little heaps, and covered up with hay. The heat, produced in each of

D d these

these masses, induces germination, and the rice is not thrown into the ground, till the germ is sufficiently developed.

The field appointed to receive it, is first kept under water for several days. It is next ploughed in two different directions, perpendicular to each other: it then receives a third ploughing, after which it is again submerged. To smooth its surface a long piece of wood, drawn by two oxen, is passed over it. It is then cleansed with a kind of rake, and, it being now reduced to a puddle, the rice is thrown into it while in this state.

Two days afterwards the land is covered anew with water, to the depth of about two inches, which remains on it for two or three days. The water is then drained off, and is succeeded by a new submersion, which remains for the same time: and this operation is continued till the harvest.

Twenty or thirty days after the rice is sown, according as the vegetation is more or less advanced, the rice-field is weeded, and they are careful in removing all intrusive plants as they make their appearance.

As one grain of rice almost always produces several stalks, a part of them is drawn out and trans-

transplanted into a convenient field prepared for them.

The rice harvest takes place towards the end of Brumaire. It is reaped like corn, tied up into little sheafs, and carried to a floor, where the grain is separated from the straw by a particular instrument. It is then cleansed, husked, put up in baskets made of palm-tree leaves, and thus preserved for use.

Nothing can be more simple than the Egyptian instruments of husbandry, and from hence, and the present indisposition of that people to improvements, we may infer the remote antiquity of those instruments.

Their plough is composed of two pieces of wood, united at one of their extremities, at an angle of about fifty or sixty degrees. The longest carries at the other end the yoke to which the oxen are fastened: the shortest is armed with a share, in form of a spade, which, in tracing the furrow, throws the mould equally on each side.

It is directed by a man who, with one hand, keeps it in a vertical plane, by means of two upright bars (*montants*), and, with the other, conducts the oxen.

The miry state into which the land is reduced

when the feed is cast into it, renders the harrow useless, but its place is supplied by the trunk of a tree drawn horizontally.

The sickle of the Egyptians is exactly of the same form with that used in France ; but it appeared to be somewhat smaller. It is used equally for reaping rice, wheat, barley, and trefoil.

To separate the rice from its pedicle, or stalk, they employ a very complicated machine. It is composed of a horizontal frame, formed of four pieces joined together at right angles. Two of these pieces receive, in a position parallel to the two others, three wooden axles, on which are fixed, by their centres, three and four wheels of plate-iron, two millimetres in thickness, and four decimetres in height. Thus the whole assemblage is moveable horizontally upon the wheels, which are so disposed, that those fixed on the same axle correspond to the middle of the space included between those fixed on the next following axle.* Above this frame is fixed a kind of seat, of clumsy

joinery,

* It cost the Translator, though not unaccustomed to contemplate machinery, some thought to understand the structure and action of this machine, from this *merely verbal* description of it. The reader will observe, in the present work,

joinery, on which fits the conductor of the oxen, yoked to it. This machine, which resembles a rolling chair, is drawn, for six hours, in all directions, over the sheaves of rice, which are unbound and spread upon an area containing about four hundred square metres. This operation being finished, the rice, though disengaged from its stalk, is still mixed with other seeds and extraneous substances ; they therefore fan it grossly, by tossing up small portions of it with wooden forks, the wind carrying off only the lightest parts. But the rice, to be perfectly cleansed, must be passed several times through sieves, which is done at the mills where they strip off its husk.

I now proceed to enumerate the articles of expenditure, in sowing ten fedans with rice.

They sow on a fedan three eights of a dareb ; but as they throw seed only into half of the land, the other half being reserved for the transplantation of the superabundant shoots plucked out of the sown fields, the ten fedans will require but fifteen eighths of a dareb, which, at the rate of

work, some other instances, in which plates would have been useful, not to say necessary ; and it is surprising that they have been omitted, or so sparingly furnished, in the French original.

Translator.

twenty-four pataques, each dareb will cost

45 P.

Besides the labourers hired by the year, the cultivator is obliged to employed extra jobbers in weeding, transplanting the rice, and cleansing the canals. The number of days they are so employed may be reckoned at four hundred and fifty, which, at ten paras each, make — — — —

50

The day-labourers, who are employed in harvest, are paid in kind. The reapers, and those who carry the sheaves to the area, are paid a dareb of rice

24

Those who drive the oxen, yoked in the carriage for separating the grain from the stalk, receive for the harvest work of ten fedans, such as it may be, five sixteenths of a dareb — — —

7 45

Total expence of sowing and reaping the rice — — — —

126 45

Annual expence, independent of this, found above — — — —

908

Total — — — — 1034 45

Immediately after the rice has been reaped, the land is covered with water for some days, and,

and, without any preparatory labour, sown anew with trefoil, the only fodder known in the province of Damietta.

They sow on a fedan three measures of seed, each worth thirty paras, which, for the ten fedans, amount to 10 P.

The cutting of the fodder, of which they have three crops from the month of Frimare till the spring, costs only ten pataques, a part of this work being done by the labourers employed for the whole year, whose wages have been already stated — — — 10

Sum — 20

Adding to this sum that which has been stated as independent advances, and the expences relative to the culture of the rice, — — — 1034 45

We shall have for the expence of cultivating ten fedans, sown successively with rice and trefoil, a total of 1054 45

The lands about Damietta, in the best years, yield six darebs of rice per fedan, and in the worst, only one: the mean between these extremes,

tremes, supposing the number of good years equal to that of the worst, is three darebs and a half. Thus we may suppose that ten fedans yield, in common years, thirty-five darebs, which, at twenty-four pataques each, produce 840 P.

The straw of the crop of rice is only used for burning, and is worth — 12

We may suppose that six tenths of the trefoil, sowed after the rice is reaped, are sold green, and that the other four-tenths are dried.

The crop of a fedan of green trefoil is sold for fifteen pataques: thus the three crops of a fedan will give 45 pataques, which, for six fedans, is 270

The crop of a fedan of dried trefoil sells for twelve pataques, and the value of three crops of the four remaining fedans, is — — — 144

Total value of ten fedans in rice and trefoil, — — — 1266

Deducting from this sum the amount of the expences of cultivation, there remains, for the profit of the cultivator, 231 pataques, 45 paras.

It remains that we enquire what would be the profit,

profit, if instead of trefoil, wheat had been sown, after the crop of rice, on the ten fedans, which we suppose in cultivation.

The labour and other preparations of the soil, in which the wheat is to be sown, are performed by the cultivator's own people. Their wages having been comprehended in the independent advances, as also the maintenance of the oxen employed in their labours, we have only to reckon here, the value of the seed, and the expences of the harvest.

Half an ardeb of wheat, which is commonly sowed on a fedan of land, at the rate of 6 pataques per ardeb, causes, for the ten fedans, an expence of — — — 30 P.

Expences of reaping, estimated in the same manner as the reaping of the rice, at three pataques per fedan 30

The former expences were found to be — — — 1034 45

We shall then have, for the annual expence of ten fedans sowed successively with rice and wheat 1094 45

Lands in wheat bring, in common years, five ardebs per fedan, which, at the rate of 6 pataques

ques per ardeb, produces for the crop of the ten fedans	—	—	300 P.
The straw of one fedan of wheat is sold for 6 pataques, or for the ten fedans		60	
Anterior value of the rice	—	852	
<hr/>			
Total produce of the ten fedans, sown successively with rice and wheat		1212	
<hr/>			

Deducting from this sum, the expences of cultivation, which we found amounted to 1094 pataques 45 paras, there remains, for the profit of the cultivator, 117 pataques 45 paras.

The results of the details into which we have entered, are

1st, That lands sown with rice, in the province of Damietta, produce, in common years 18'4 for one; whereas those sown with wheat only produce 10.

2dly, That the mean price, per day, of the labours of agriculture is 10 paras.

3dly, That the feeding of the oxen, may be estimated at 12 paras per day, in the different seasons of the year.

On this last article, I must observe, that the oxen which work the mills for cleaning the rice, of which I shall hereafter speak, being generally a great deal stronger, and having more severe labour

hour to undergo, require for their daily support, an expence of not less than 18 or 20 paras.

Barley is sown in places where the irrigation is more difficult, and where only a small number of cattle can be kept. The produce of the grain sown in rice-grounds would not be sufficient to compensate the cost of irrigation, which must always be supported, whatever be the succession of crops.

As to flax, what is used in the linen manufactures of Damietta, comes from the neighbourhood of Mansoura, Semenhoueh and Cairo. Nevertheless experience has proved, that it may be cultivated in the province of Damietta. The following is some information, furnished by the Sheik of Senanieh, who told me that he was the first person in the country who entered upon the culture of this article.

The land on which the flax is to be sown is allowed to lie fallow for six or seven months. It is then ploughed four times, and covered with a layer of ashes, after which the flax is sown. It remains upon the land, from Frimaire to Germinal.

The field is intersected with little trenches, into which water is introduced, when the plant requires irrigation. Immediately after the flax is reaped, the land is prepared to receive rice transplanted from some other field.

Pataques

The expence for labour for ten fedans, is	23
Manure, including its carriage	16
Half an ardeb of feed is sown on each fedan, which, at the rate of nine pataques per ardeb, occasions for the ten fedans, an expence of	46
Irrigation, at different times	20
Reaping the flax, at the rate of six pataques per fedan	60
Spreading it on the field, and making it up into sheafs	30
Threshing out and collecting the feed	35
Carrying home the flax, at least	40
Steeping it, and the concomitant expences	36
	—
Total expence of cultivation	306
	—
Three ardebs of flax-feed are gathered from each fedan. It is sold at 9 pataques and 54 paras per ardeb, which produces, for the ten fedans,	288
The flax reaped from a fedan is sold for 22 pataques, and for the ten fedans	220
	—
Total produce	508
	—
Deducting	

Deducting from this sum the expence of cultivation, there remains for the profit of the cultivator, 192 pataques. This profit of 192 pataques, will appear extraordinary, when compared with that which results from the cultivation of rice ; but I would observe, that in the detail of expences, I have only included the hire (*location*) of the oxen, during the time of their being employed by the cultivator in labour and irrigation.

All the lands in the neighbourhood of Damietta, are sold at the rate of ten times their annual rent, deducting taxes. The same causes which have raised the interest of money above its ordinary rate, in several of the States of Europe, have in Egypt depressed the value of land, in which individuals, strictly speaking, possess only a life-rent ; the grand Signior, being, according to the common opinion, the sole proprietor of the land, ever since the conquest of the country by the Sultan Selim, in 1517.

The proprietors receive the rent of the land in kind, or in money. When they are paid in kind, common usage assigns them one third of the crop, the farmer defraying all the expences of cultivation. This rent, reduced to money, varies from 10 to 4 pataques per fedan, according as irrigation is more or less easy.

Of

Of the different productions of which I have been speaking, rice is the only constant object of commerce. It is exported to the different seaports of Syria, to the islands of the Archipelago, and in general to every part of Turkey. But it is not exported in the state in which it comes from the hands of the cultivator. The merchants of Damietta commonly purchase it in a rough state, and have it cleansed and husked. Here follow some details concerning the mechanical part of that operation, and the expences with which it is attended.

The rice is first exposed to the sun for ten or fifteen days. It is then passed under hollow cylindrical pestles (*pilons*), of iron, about three decimetres in height, and one in diameter. The pestles are fixed at right angles, to a handle (*manche*), moveable in a vertical plane, upon an axle placed at one metre from their extremities. The movement of the sweep (*bascule*), is produced, like that of a forge hammer, by the pressure successively exerted on the extremity of the handle, by four cogs (*mentonnets*), which cross the horizontal axle of a cog-wheel, put in motion by a larger one, whose vertical axle carries a lever to which one or more oxen are yoked, according as the machine is furnished with two or four pestles.

The

The rice is placed under these pestles, in a kind of mortars fixed in the ground, each of which contain the tenth of a dareb. They are about a metre asunder, so that the intermediate wall which supports the axle of the pestles, serves as a seat for a labourer, whose constant employment is to return, under the pestles, the rice which tends to escape at each stroke.

The grain is at first subjected to this operation for two hours, that time being sufficient to free it from a part of the husk; but as the action of the pestles upon it in this state, would be partly lost on the husks already detached, the rice is taken out to be cleaned. It is then put under the pestles for two hours more; when, being again cleaned, it is a third time subjected to the same operation. A fourth beating, along with a certain quantity of salt, completely cleans it; after which it is sent to market in the state in which we see it.

The labour of, at least, thirty hours is necessary for compleatly cleaning a dareb of rough rice, which, when the grain is good, produces an ardeb and two-thirds of clean rice, and an ardeb and a half, if the grain be of an inferior quality. Thus we may suppose that the medium produce of a dareb is seven-twelfths of an ardeb.

A mill

A mill with two pestles, kept working day and night, requires nine oxen and seven labourers; relieving one another by turns. The expence of supporting the oxen, the wages of the labourers, the interest of the first advances, and the wear and tear of the machine and buildings, make the price of cleaning a dareb of rice amount to five pataques, and that of cleaning an ardeb, to three pataques fifteen paras. If to this we add twenty per cent for the profit of the merchant, the rice, as it lies in the warehouses of Damietta, costs, in common years, twenty-two pataques per ardeb.

It appears from the custom-house books of this place, that the quantity of rice exported, for eight years, from the port of Damietta, was 228,357 ardebs, which makes an annual average exportation of 28,544 ardebs.*

* The quantity of rice exported was,

In 1791	- - - - -	38,853	ardebs
In 1792	- - - - -	31,039	
In 1793	- - - - -	26,256	
In 1794	- - - - -	19,242	
In 1795	- - - - -	24,275	
In 1796	- - - - -	22,315	
In 1797	- - - - -	29,544	
In 1798	- - - - -	36,863	
			Total
			228,387

Average annual exportation 28,544

Such

Such is the information which I have collected, concerning the cultivation and commerce of rice. I make no doubt but, by new researches, one might obtain results much nearer the truth. But, to obtain them with the utmost accuracy, the cultivators, whom it will be necessary to consult on the produce of their lands, must be well convinced that the questions addressed to them, are not put with a view to load them with new taxes: otherwise they will always be inclined, as they are at present, to magnify the account of their expences, at the same time that they will endeavour to diminish that of their profits.

Observations on
THE FOUNTAIN OF MOSES,
By Citizen GASPARD MONGE.

ON the western shore of the Gulph of Suez, four leagues to the south of the town, and almost opposite to the valley of Pilgrimage (*Egarement*), are certain springs marked on all maps, and known by the name of the fountain of Moses. It would be a mistake to suppose, that the name of those springs derived its origin from the fabulous times of Egypt, and had been preserved till our days, by uninterrupted tradition. It is very probable that, like the fountain of the Virgin at Matarieh, (the ancient Heliopolis) and like some others, that name does not reach beyond the establishment of Christianity in Egypt, when the ancient names relating to an exploded religion, gave place to others analogous to the new opinions.

Although the water of the fountain of Moses be less salt than that of many wells dug in other parts of the desert, yet it is brackish, and consequently does not quench thirst so well as fresh

water:

water: but it is capable of preserving vegetable and animal life, and we drank it for four and twenty hours, during a painful journey, without being incommoded by it. Besides, as this water is continually exhausted and renewed, it is always transparent, and hath no disagreeable smell or taste; whereas that of most other wells is commonly rendered turbid by the agitation excited in drawing it, and has almost always a fetid odour. For example, the well of Agirout, situated four leagues to the north of Suez, and which refreshes the caravan of Mecca, on the third day from Cairo, is two hundred feet deep; but the putrefaction of the animal and vegetable substances which fall into it, from accidents almost unavoidable, gives the water, in addition to its natural saltneſs, an odour of sulphurated hydrogen which is scarcely supportable.

In all ages the fountain of Moses must have been exceedingly valuable to the Arabians of Tor, who inhabit the neighbourhood of Mount Sinai. The Arabians, obliged to draw from Egypt a part of their subsistence, and the objects of foreign industry, must always have carried in exchange the products of the meagre forests, which cover their mountains. This transport could only be

performed by caravans, and the fountain of Moses must always have been one of their stations. Besides, from the time when maritime establishments were formed in the bottom of the gulph, whether at Suez itself, or at the entry of the valley of Pilgrimage, on the road from the Red Sea to Memphis, the fountain of Moses must have been frequented; because it was an indispensible resource when, after long droughts, the cisterns for preserving rain water were exhausted.

But the epoch at which the fountain of Moses appears to have excited the most interest, is that of the war which the Venetians and the Egyptians jointly waged with the Portuguese, after the discovery of the passage to the Indies, by the Cape of Good Hope. It is well known that these republicans, in order to defend the sceptre of commerce which they had hitherto held, and which was about to elude their grasp, built and armed fleets at Suez. It is not probable that they ever established dock-yards at the fountain of Moses, which presented no local advantages for such an object; but it appears that they formed an extensive watering place there. No part of the works which were above ground remains. The whole

whole has been scattered or destroyed by the Arabs, except the foundations and some subterraneous works. These vestiges, which are still considerable, and which, during our short stay, we could but partially survey, principally consist of large reservoirs constructed with care, to which the water was brought from the springs, in subterraneous channels, and from whence it was conducted by a great channel to the sea shore. General Buonaparte discovered this last channel, and had it surveyed in its whole extent, which is from seven to eight hundred fathoms. It is constructed of good masonry, covered through its whole length, and has the same declivity with that of the soil in which it is formed. The sand, which the water has carried into it since it was abandoned, has obstructed it in the first fifty fathoms; but all the rest is in so good a condition, that, with a moderate expence, it might be repaired, and made fit for service. On the beach, the channel terminates between two small mounts (*mamelons*), lengthened out with rubbish, and which appeared to us to be the vestiges of a watering place properly so called. This watering place must have been disposed in a manner agreeing with the form and nature of the vessels in which they generally embarked the water.

At the distance of two hundred fathoms, to the northward of the last spring, there is a considerable hillock, which, like the *Monte Testaccio* at Rome, is wholly formed of fragments of jars, and other earthen vessels, spoiled in the burning. We found evident remains of furnaces, so that there must have been on that spot, a large manufactory of pottery. The object of that establishment could not be the fabrication of the earthen ware, which composes the chain pumps (*chapelets**), by which the water is drawn from the wells, to irrigate the lands throughout all Egypt, which have not the advantage of inundation. Indeed, ever since the lands about the fountain of Moses were inhabited, they were cultivated all the way from the springs to the shore. We still see there a great number of young date trees, distributed with an order which cannot be the effect of chance. These date trees, which have probably sprung from the stocks of old ones, are at least an indication of an ancient cultiva-

* In Saverien's *Dictionnaire de Mathematique, &c.* *chapelet* is described as a sort of chain pump, which he says, on the authority of Perrault, was invented by a Florentine of the name of Francini, and executed about the year 1680, in the French King's library at Paris. But this engine is probably of a different construction from that mentioned in the text, which is said below to be of high antiquity.—*Translator.*
tion,

tion, which hath been abandoned. But that cultivation required no drawing of water for irrigation; for the water of the fountains could easily be conducted, in open trenches, to all the cultivated fields, and therefore the chain pumps were not necessary. Accordingly, among the great number of fragments which form the hillock, we did not find one which could have belonged to the chain pumps, the form of which hath not varied for many ages. And we were inclined to believe, that the object of establishing this great pottery was the manufacture of large jars, to keep water on ship-board, in a country where the scarcity of wood, and perhaps the want of industry, rendered the construction of casks impracticable. Thus, those who came for water to the fountain of Moses, were sure to find there jars proper to contain it, and probably other earthen vessels for which they had occasion.

The fountain of Moses presents a remarkable hydrostatical phenomenon. The different springs which compose it, and which are eight in number, are all situated on the tops of conical hillocks, each terminating in a crater, which forms a basin for its spring, the water running down the conical surface in natural channels. Those hillocks are of different heights: the highest is elevated

about forty feet above the surrounding surface. The spring of this last has been long dried up, its crater is filled with sand, which the wind has carried into it, and there is still near it the trunk of a date tree, which, after attaining a great height, was cut down by the Arabs.

It was not difficult for us to give a reason for the formation of the hillocks, on the top of which the springs arise. The humidity which the water of a spring diffuses through the neighbouring soil, preserves around its basin a perpetual vegetation. The grafts produced by that vegetation diminishes the velocity of the wind which agitates it, and makes it leave the larger grains of the sand which it carries along. This sand, sheltered by the stalks, at the roots of which it is deposited, and retained by the moisture which makes it begin to adhere, is enabled to resist the attacks of the most violent wind. The carbonat, or the sulphat of lime, which the water of the spring holds in solution, and which is denuded by evaporation, crystallizes among the grains of sand; and forms a glutinous substance, which compleats their adherence. Hence the edges of the basin are a little raised, and the water is forced proportionably to raise its level, in order to make its escape from the basin, and to diffuse

diffuse itself abroad. The circumstances which give rise to this operation, being, from their nature, often repeated, their progress, though slow, are, so to speak, continual, and, after a long lapse of time, the spring, which is always gaining elevation, issues from the summit of a little conical hill, formed of a sandy stone, which strikes fire with steel, and is impregnated with salt, like the water of the fountain.

The spring, which has the most elevated crater, being dried up, it is natural to suppose that the height of forty feet, to which it has arrived, is a *maximum*, determined not so much by the pressure which affects it at the base of the hillock, as by the resistance of the walls of the natural subterraneous conduits which convey it; so that the water having reached that height, might have burst those walls, broke out at other issues, and produced new springs, which drained the first, and which, in succession, have formed the little hills on the tops of which they are all at present situated.

However this may be, it is very probable, that at a remote period, the fountain of Moses had no other exit than that which has been long dried up, and that the eight springs which now afford water, and whose craters are less elevated,

have been produced at a later period, either by the natural rupture of too weak conduits, or by the excavations which have been made for different purposes, at the time when the fountain was frequented, and when its vicinity was inhabited.

It would have been interesting to examine the form and structure of the natural channels which convey the water to the fountain of Mofes, across an extensive plain of sand, and in which it bears a pressure capable of raising it more than forty feet above its level, and to ascertain whether this water comes from a chain of mountains which originate in Syria, and terminate at Mount Sinai, and which is seen at the distance of about four leagues to the east of the fountain ; but our time would not allow us to enter on these researches, which were of no immediate utility.

EXTRACTS

*From the Geography of Abd-er-rashid El-Bakouy,
on the Description of Egypt,*

By Citizen MARCEL.

A LY* Abd-er-rashid, Ebn-saleh, Ebn-Nou-
ry, surnamed El-Bakouy, was a native of
Bakouieh †, a very considerable town, situated in
the

* In the National Library is a copy of this work, No. 585, of Arabic MSS. I shall take the liberty to extract from it some various readings, in order to compleat the interesting remarks of Citizen Marcel, and those which Citizen Deguignes has made on the same work, and which are to be found in the second volume of *Notices & Extraits des Manuscrits de la Bibliotheque Nationale*.—L—s. (These letters, L—s, stand for the name of Langlés, one of the librarians in the *Bibliotheque Nationale*.—Translator.)

† Bakouieh, or Bakou, is a port on the Caspian Sea, and the capital of Shirvan, the northern province of Persia. This town is known in Europe by its commerce, and famous in the East, especially among the Hindoos, on account of the springs of Naphtha, which exist in its neighbourhood. The followers of Brachma have gone on pilgrimage to those springs, from the most remote times, as the Pouranas, and other ancient Sanscrit books, attest. Among the numerous European travellers who have spoken of Bakou, I shall content

the country of Derbend, on the borders of the Caspian Sea. His father, El-Imam El-alem saleh ebn Noury, followed the sect of the Iman Shafey* and arrived at extreme old age.

The year of the birth of Abd-er-rashid is not well determined; but it is certain that he wrote about the year 806 of the Hegira, or 1403 of the vulgar æra. His work, entitled *Kitab talkis El-atsar fy ajaib El-melik El-kahar*, that is, the

content myself with citing the interesting and adventurous Forster, who visited those springs of Naphtha, called *Atefz-gah* (the place of fire in Persian), and who recounts a long conversation which he had with the Hindoo mendicants, or hermits, who have settled near this place of devotion to receive their pious countrymen. See *A Journey from Bengal to England, through the Northern part of India, Kashmire, Afghanistan and Persia, and into Russia, by the Caspian Sea*. Vol. ii. p. 227, 231. (L-s.)

* Doctor Abou Abdallah, Mohammed ebn Eddrys, surnamed *Esh Shafei*, was the first who wrote on the mussulman jurisprudence. He composed a book on the *Offoul*, or foundations of islamism, in which are comprised all the laws of the Mahometans, both civil and religious. There are beside two works of his, entitled *Sounan* and *Mesnad*, on the same subject. He became the founder, and the chief of one of the sects acknowledged to be orthodox by the mussulmans; and his doctrine is in such estimation in the East, that *Salah-ed-Din* (Saladin) founded at Cairo a college, in which any other system was prohibited to be professed or taught.

book

book explaining the traditions concerning the wonders of the Almighty King, is a kind of universal geography, arranged according to the order of the climates, the composition of which he finished in the 815th* year of the Hegira, or the 1412th of the common æra.

I thought that an extract from this work, relative to the description of Egypt, might be useful upon many accounts: and this consideration has induced me to make public an extract which I made for my own private use.

It seemed to me, that in our present circumstances, it was absolutely necessary for us to become as accurately acquainted with Egypt as possible, and that one of the most effectual means to acquire that acquaintance, was a comparison of what modern travellers and European geographers have written concerning that celebrated country, with a description which the oriental writers gave of it some ages before, and with the

* The manuscript in the National Library has these words, p. 142, *Seneh set oue aſher oue tſemanmaieh*, "this writing came from the pen of its author, in the year "eight hundred and sixteen," and not 806, as is intimated in the Remarks of citizen Deguignes, p. 456, and which is visibly an error in the printing. (L—s.)

accounts,

accounts left us by Greek historians, and geographers, at a period much more remote.

I have therefore made with pleasure an extract from one of the Arabian Geographers, whose writings, though less known in Europe than those of many other oriental authors, contain nevertheless details perhaps as valuable as those which have a more extended reputation among us, details which may be supposed so much the more curious and interesting, as they have been hitherto unknown.

It must be allowed, that the work of Abd-er-rashid contains, in common with those of all the eastern writers, some inaccuracies, which arise from their general ignorance of ancient history; but these inaccuracies are easily perceived, and hence there is little danger of their leading us into error.

The orientals interlard all their writings with prodigies and extravagant stories, to which they give entire credit. I thought it my duty not to retrench any of these fables in this extract, and that I ought to leave the author his own oriental style and original form; as those fictions afford us the means of appreciating more exactly the progress which the sciences and geographical knowledge

knowledge had made in the East, at the epoch when Abd-er-rashid wrote.

Besides, it should be considered, that almost all those fables are only truths more or less disfigured, which always subsist under the gross covering with which credulity and error have thought proper to conceal them; and perhaps it belongs to true philosophy, restored by victory to her original country, to carry her illuminating torch under these thick veils, to expose by her light that incoherent mass of heterogeneous opinions, that chaos of systems, differently altered, which circulate among all the people of the East, and, by clear discussion, to draw from them some real facts, some accurate truths, which hitherto might have escaped the most penetrating and attentive eyes.

These extracts, from the geography of Abd-er-rashid, will be followed by some portions of Aboul-faraje, and other oriental historians, from whom it cannot be disputed that we ought necessarily to draw our information, if we wish to have that true knowledge of the history of the East, which can only be derived from that channel.

FIRST EXTRACT.

Of Egypt in General.

THE parts of the earth capable of being inhabited, both on the north and south, are divided into seven climates of different magnitudes. They extend in length, from the west to the east, from the islands called *Jesair-el-Kalidat* (the Canaries), whence *Bathalmious El-Kludy** (Ptolomy) hath begun to calculate his degrees. They comprehend all the region of the earth which extends between the two seas. Their

* It is thus that the learned Casiri, in his *Bibliotheca Arabico-hispana*, tom. 1. p. 349, and other orientalists, read this word, and they translate it by *Claudius*. But I adopt much more willingly the sentiment of D'Herbelot (Biblioth. Orient. p. 193), who reads it, *floudy* (or *floudsy*), and translates it, *a native of Pelusium*. In fact, Ptolomy was a native of that town, which is now called *Thineh*. (See D'Anville's Memoir on Egypt, p. 97.—The change of *kloudsy* into *floudsy* is so much the more easy, as there is only the difference of a diacritic point, instead of two, over the initial letter, which produces a *fe*, instead of a *kaf*. Add to this that in Arabic, as in our European languages, the first name always precedes the appellative. It must then have been *el-kloudsy el-bathalmious*, or rather *el-kloudious*; for all the Latin words terminating in *us*, preserve that termination in Arabic: besides, the national name is always placed after the proper name.—(L—s.)

breadth, from north to south, extends from the circle of the star *Sohail* (Canopus) to that of *Benat-en-Nach**, the Great Bear.

The *Said*, or Upper Egypt, and the course of the Nile, make a part of the first and second climates: this region extends on the south to the country of *Noubeh* (Nubia).

Lower Egypt, the towns of *Mesr* (Cairo), and of *Iskenderieh* (Alexandria), are contained in the third climate; at its extremity, the length of the day is thirteen hours and a half and a quarter.

Mesr (Egypt in general). The extent of this famous country is forty miles†. Its length is from *El-Arish* to *Asouan*, and its breadth from *Eilah* to *Barkah*. The name which it bears comes from *Mesr*, the son of *Mes-*

* Literally, *the daughters of the funeral car*. This expression particularly denotes the three last stars, which form the tail of the Great Bear, although it be often applied to the whole constellation, which is also called *Ed-Doubbeh* (the Bear).

† The manuscript in the National Library signifies *forty nights*. The same expressions are found in the geographical and historical description of Egypt by *Al Mikrify*, No. 797 of the Arabic manuscripts, p. 11. The Arabian authors frequently reckon by nights', and not by days', journeys. This measure is the same to them, and is equivalent to six or seven of our common leagues.—(L—s.)

*rain**, the son of *Cham*. It is looked upon as the best country in the world; and, as long as there are men in it, abundance will reign there. It is surrounded with moving sands, which are agitated by the impulse of the winds. It very seldom rains there, and the little rain which falls, only augments its fertility and its riches. At the end of summer, the time when all waters commonly diminish, the Nile acquires, on the contrary, such an increase, that all the lands of Egypt are inundated; and, when this increase rises to 12 cubits, it is solemnly announced to the people.

There is in the middle of the Nile, a mosque, built by the Califf *Al-Mamoun*†, when he came into

* GEN. ch. x. 7.

† *Al-Mamoun aboul abbas, abd-oullah, ebn' Haroun.* This prince, the son of Califf *Haroun-ar-Rashid*, was the seventh Califf of the house of the *Abbacides*. He was born in the year 170 of the Hegira (786 of the common æra) and succeeded, in the year 193 (813) to his brother the Califf *El-Amin Mohammed ebn Haroun*.

The memory of *Al-Mamoun* will always be dear to literature and the sciences, which he loved and protected in an effectual manner, and favoured their progress and advancement with all his power, and at an extraordinary expense.

It is to him that the Arabians owe the knowledge of the best

into Egypt. Behind this mosque, is a *canal*, from the midst of which rises a column of white marble 24 cubits in height. Every cubit of it
is

best books in Hebrew, Syriac, Greek and Latin, which he caused to be translated into Arabic, and extended and encouraged the study of them. To him also, the learned in Europe owe the preservation of sundry works and fragments of ancient Greek and Latin authors, who, no longer existing in their original languages, have found a refuge in the Arabic translations.

Not content with having transfused into his own language, the riches of other nations, Al-Mamoun wished also to invite all the learned men whom he could collect, not only among the nations subjected to his empire, but also among the Jews, the Christians, the Greeks and Persians, and even among the Magi, the Guebres and the Indians. Whatever was their sect or their religion, they partook equally of his favours. He was happy in their society, and delighted above all things, in assisting at their literary discussions.

Under his reign, flourished the astronomer *Habejh el-Merouzy*, the author of three books of astronomical tables, *Ahmed ebn Kotseir el-Farghany*, known to us, under the name of *Alfragan*, *Abdoullah ebn Sahel ebn Noubakht*, *Mohammed ebn moucy el khouarezmy*, *Ma-sla-allah el yehoudy*, and *Yahia ebn-Abyl-mansour*, whom he caused to make a great number of astronomical observations, at *Chamasich*, near Bagdad, and on mount *Kasfoun* near Damascus.

Among the learned physicians, whom he assembled at his court, we distinguish *Sahel ebn sabour*, surnamed el-kouceje, *Jebrail*, who treated of the diseases of the eye, and *Youhana ebn-el-Bathrik*, to whom was given the name of *el-ter-*

is marked and divided into 24 inches, and each inch is again subdivided into 6 lines, or small measures. This column serves to indicate with exactness, the successive augmentations of the Nile, the overflowing waters of which cover the earth for the space of forty days*.

The Nile is generally regarded as the river which has the longest course. It is said to extend one month in the country of the mussulmans, two months in that of *Noubeh*, (Nubia) and four months in the deserts which contain its source. It has its origin in the Belad el-Kamar (the country of the moon) beyond the equatorial circle ; and runs from south to north, in the hottest regions. Its augmentations and diminutions take place in regular proportion. This river gives birth to a great number of *Temsa*h (crocodiles) animals which exist no where else, *jeman* (the translator) because he translated into Arabic, the Greek authors who wrote on medicine.

Al-Mamoun, after reigning twenty years and eight months, died of the fever and ague, near the river *Bedendoun*, at the age of 48, in the year 218 of the Hegira, or 833 of the common æra.

* In the manuscript lodged in the national library, the word rendered in this paragraph *canal*, is *Sehrije*, a basin, a fish-pond. What is meant, is the *Mekias*, of the island of *Raoudhah*, constructed by order of *al-Mamoun*, in the 200th year of the Hegira (L-s.)

except

except in the river *Sind*, which waters the country of *Hende* (India) but those which are produced in this last river are much less than those of the Nile*.

There is also in Egypt, a tree which is luminous during the night, and appears as if covered with flame. The Greeks gave it the name of *Moukikous*.

That country likewise produces a plant, of which cords and cables are made. The natives of Egypt give it the name of *Dis* (a kind of reed).

The mountains of *Safan* † produce cottons of a singular

* The *Sind* (*Sindhy* in Sanscrit) also forms, like the Nile, a Delta at its mouth ; and major Rennel, in his *Memoir for a map of Hindostan*, p. 285, points out many striking resemblances between the province of *Sind* and Egypt. It is also observable, that crocodiles are not rare in several parts of Africa and Asia, and particularly in India, where there appear to be two species. (L—s.)

† The manuscript in the national library, makes no mention of the mountains of *Safan*, and I even doubt whether any mountains in Egypt ever bore that name. Perhaps the translator saw a diacritic point where there should not have been one, and read *Jebal el Safan* (the mountains of *Safan*) instead of *Habbal el-sufun* (cables of vessels) as the Arabians usually suppress the vowels, these two readings offer no difference, but the diacritic point which I have mentioned. The sense which I propose, appears to me to be justified by the following words, “ They make with these

a singular nature. They are kindled, burn, and are extinguished, like a flambeau; insomuch, that, when a light is wanted, it is sufficient to take them by one end and agitate them for some time: the motion inflames them, without the contact of fire.

Egypt also boasts of producing asses of an extraordinary size, and in point of strength, similar to mules. In some of the cantons of it the soil is said to yield melons, of Indian origin*, the taste of which is very agreeable, and their size sometimes so large, that two of them are said to be a sufficient load for a camel.

Among the feathered tribe there met with, we distinguish a bird which preys on fishes. Its body is black, but its head is covered with "reeds (*Dis*) cables for vessels; they also kindle bits of it, "which burn like a flambeau, and afterwards are extinguished, &c." See the manuscript in the National Library p. 60. (L—s.)

* *Bathik hindy*, the melon of India, *Angouria*. The Arabians also call this fruit *Bathik rekky* and *Feje*, and the Turks *Chamkaouny*, the melon of Syria. The generic name of the melon in Arabic is *Bathik*, in Turkish *Kaoun*, and Persian *Korbzeh*. On this fruit, consult Forskal's *Flora Ägyptiaco-arabica*, p. 167, chap. Ixxv, cxxii, Hoeftes's *Nachrichten von marokkos*, p. 309, Abdellatiphi *Compendium memorabilium Ägypti*, cap. ii. p. 26, of the Arabic edition of Joseph White, and p. 87 of the German edition of M. Gunther Wahl. (L.—s.)

white feathers: the name of it is *Oukab-en Nil*, the eagle of the Nile.

The *Nems* (the Ichneumon), is another animal peculiar to Egypt; its size is small, and its colour red, except the belly, which is white. It is said to have a singular enmity to the crocodile. It avoids the sight of large serpents; but, if it happen to be caught by one of those reptiles, it diffuses through its mouth an odour so insupportably fetid, that the serpent tears itself to pieces in endeavouring to get rid of it.

Among the most wonderful and remarkable things in Egypt, are the two great pyramids (El-Heraman), situated on the western bank of the Nile, near Fosthath.* They are built of great squared stones, and their height is three hundred and seventeen cubits (548 feet, 1 inch, 9 lines). Their four sides, which gradually diminish in ascending, are equal to each other, and their breadth at the base† is four hundred and sixty cubits (795 feet 5 inches),

* Situated in the face of Fosthath (El-heraman el-mohadsyan lil Fosthath). M. S. in the library, p. 60.

† All the writers ancient and modern, who have described the pyramids, have varied in giving their dimensions. The height of the great pyramid, according to *Abd-er-rashid*, approaches nearly to that given by *Diiodorus Siculus* (near six

The construction of these ancient monuments, built with all the proportions necessary to give them solidity, is a master-piece of art, and neither winds, tempests, nor earthquakes, have hitherto shaken them.

It is asserted, that formerly the pyramids were covered with different sculptures, and even that they bore inscriptions in ancient characters, called *mousnad* or *hemiary*.* This inscription bore,

hundred feet), and the base which he here gives of one of the faces, is almost the same with that which we find in *Herodotus*, (eight hundred feet). *Note.* The men of science who went on the expedition to Egypt, have determined the height of this pyramid.

* In the ancient Arabic were two principal dialects, which took their names from the most considerable tribes who used them.

The one was called *Arabiet Hemiar* (the Arabic of Hemiar), and the other *Arabiet Koraish* (the Arabic of Koraish).

The following is what we learn from the oriental writers, respecting those two ancient idioms.

The dialect of *Koraish* is common to the Koraishites, the descendants of Ishmael, and to the tribes settled in the *Hejaz*, a portion of Arabia, where we find the two celebrated cities of Mecca and *Yatrib* (Medina). It was accounted the most pure language; and thus it received, by way of eminence, the name of *the clear and elegant language*. This was the dialect which Mahomet spoke and used, in all his writings.

This language was afterwards sensibly altered, by the mixture

" That the construction of those monuments at-
" tested the power of the Egyptian nation, and

mixture of foreign words, brought by the numerous caravans which annually visit Mecca ; and at present it is only a jumble of different idioms, Asiatic and African.

The dialect of *Hemiar* claims an origin much more ancient than that of *Koraish* ; and the Arabian authors assure us that it was used in the most remote times, even from the period when the Arabians began to be incorporated as a nation.

It was the particular idiom of the tribes known by the name of the Hemiarites (the *O'μηρίται* of Ptolomy), who inhabited a portion of Arabia the Happy, and drew their origin from *Hemiar*, the son of *Abd-eft-shems*, one of the children of *Yachab*, and the grandsons of *Kaithan* or *Iokithan*, who is believed to have been the first king of Yemen. These tribes were considered as the most noble and considerable in all Yemen. They have given kings to all the neighbouring nations, and the dynasty of the *Ismaelians*, who reigned in Persia, was of Hemiarite origin. A long time before mussulmanism, the Hemiarites had already conquered a part of Africa, where they had established their colonies, and diffused their language.

The capital of the ancient Hemiarites was *Mariba*, known at the present day, by the name of *Mareb*.

According to *Aboul-feda*, the kings of the Hemiarite race reigned over Yemen, for a period of 2020 years, from *Hemiar*, who ascended the throne about the year 1698, before the vulgar æra, to *Zoul Naouas*, who lost his crown and his life seventy years before the birth of Mahomet (502 of the common æra), in an irruption of the Ethiopians, who feized upon all his dominions.

“ that it was easier for men to destroy them, than
“ to erect their equals.”*

The Hemiarite language was lost in the conquests of Mahomet and his successors, and no vestige of it remains; but all historians agree, that it was very different from the Arabic language, properly so called; and, on this subject, they cite the following proverb, common in the mouths of the Arabians: “ Let the Arabian who comes to *Dsafar* “ (one of the principal towns of the Hemiarites), learn the “ dialect of Hemiar.”

The Hemiarites had not only a dialect peculiar to themselves, but also their own manner of writing, the characters of which are also unknown to us. That writing bore the name of *Mousnad*; and *ebn Khalikan* tells us, “ that the “ letters of it were disunited, and very distant from each other.”

It was unlawful to communicate the knowledge of it to families of the inferior class, or to any stranger, without the special permission of the government.

Nevertheless, more than one Arabian author is said to have discovered, and interpreted Hemiarite inscriptions. *Aboul-feda* says that *Shamer ebn Malik*, king of Yemen, caused to be engraved upon one of the gates of Samarkand, about the year 900 before the common æra, a Hemiarite inscription, which signified, “ That from Sanaa to Samarkand, was a thousand parafangs.”

It appears that the Hemiarite characters were already forgotten in the time of Mahomet, and that their place was supplied by another manner of writing, which had become common among the different tribes of Arabia.

This manner of writing was called *koufy*, from the name of the town of *Koufa*, in Mesopotamia, where it was invented,

Tradition informs us that those pyramids contain sepulchres, and that in the year 225 of Hegira of the prophet, to whom be salvation and benediction (839 of the common æra), there was

invented, and from whence it was brought to Mecca and Medina, by *Mazar Ebn-Morar El-Anbary*.

In the east, are many monuments, on which we read cufick inscriptions. I have observed them particularly on the soffits (*soffites*) † of the entrances of the great mosque at Alexandria, and in several parts of the citadel of Cairo.

In short, the cufick characters themselves gave place to the Arabian writing now in use, which was invented by the Vifir *Ebn-Mokla*, and which has been transmitted to our days, without any sensible change.

* The following is the text and the translation of this inscription, as it stands in our manuscript, p. 60:—" *Anny benitou houma femen yeda-ay koueh fy mulk-hi fely ha de-mou-houma feen el hadem eicer min el-bena oue kad keçoue-nahouma beldeibaje fe men iftetha a fe-liekfou houma bel-hasr.*"—" I built both of them: let him who wishes to show his power destroy them. It is nevertheless easier to destroy than to build. We covered them with a precious robe: let any who can, cover them only with mats." Almakrify, under the article Pyramids, cites four readings of this inscription, the substance of which is always the same. (L-s.)

† *Soffita*, *Saffita*, or *Soffit*, signifies, in ordinary buildings, the board over the top of a window; in great edifices, the ceiling of an apartment, formed by cross beams, or flying cornices, and having the square pannels of its compartments enriched with sculpture, &c. See Neve's Builder's Dictionary. *Translator.*

found in them a book, written in unknown characters, of which, however, an old man of the Christian monastery of Kalmoun accomplished a translation.

That book made mention of celestial observations, made for the construction of the pyramids, and observations still more ancient, according to which, by comparing the different relations of the heavens to the earth, a prediction had been discovered, importing, that the earth would one day be entirely overwhelmed and destroyed.....*

“ In consequence of this prediction, a king of
“ Egypt, named *Sourid*, the son of *Salhouk*, re-
“ solved to have a tomb erected for himself, and
“ two others for the rest of his family. He chose
“ for his own tomb, the pyramid situated the
“ most easterly. That which stands towards the
“ west, was designed to contain the tomb of his
“ brother, and his nephews were to have their
“ sepulchre in the third.....”

* Our manuscript gives a very different sense. The following is a translation of it: it is always the text of the ancient Egyptian book. “ We have inscribed upon the walls (of the great pyramid) the calamity which is to descend from heaven on the four points of the world, and that when the heart of Leo shall pass into the first minute of the head of Cancer; and such will be the situation of the planets in the heavens, the sun and the moon being in the first minute of Aries, &c.”

Celestial

“ Celestial observations had been made at
 “ the first minute of the sun’s entry into the
 “ heart of Leo, approaching to the head of Can-
 “ cer, all the other stars entering into that sign ;
 “ the sun and the moon in the first minute of
 “ Aries ; *Refan* * (Saturn) in the twenty-eighth
 “ degree, one minute of the same sign ; *Melokh*
 “ (Mars) in the twenty-ninth degree, three mi-
 “ nutes of Pisces ; *Venus* at the twenty-eighth de-
 “ gree ; *Mercury* at the twentieth-seventh degree of
 “ the same sign † and *Pikheus* (Jupiter) in Li-
 “ bra.....”

“ Sourid

Our manuscript makes no mention of an inundation. In it we read that “ the astronomers having predicted, that “ a calamity (*afet*) proceeding from heaven and earth, “ should destroy the plants and animals of the earth, they “ advised Sourid Ben Salouk to have a tomb built for him “ and his family. For this reason, the eastern pyramid was “ constructed for him, the western for his brother, and for “ his nephew that which had a covering, &c.” (L—s.)

* *Refan* (*Ρηφαν*), *Melockh* (*Μελοχ*), and *Pikheus* (*Πικχευς*), are the names which the ancient Egyptians gave to the planets, Saturn, Mars and Jupiter. The Arabians called them by the names of Zohel, Merrikh and Mouchtery.

† I have interpolated the passage in Italicks, from the M.S. in the National Library. I may add, that these astronomical observations are more extensive and detailed, in the work of Al-Makrify. They are to be found at large in my Memoir on the Pyramids. (L—s.)

“ Sourid, after his death, was interred, according to his orders, in the eastern pyramid, his brother in the western pyramid, and Kouros * his nephew, in the third pyramid.”

“ The entrance into those pyramids was by a subterraneous edifice †, the length of which was one hundred and fifty cubits (259 feet, 4 inches, 6 lines). The portico of the eastern pyramid was situated towards the east, and that of the western towards the west: the entrance of the third, which was called Mouzer ‡, was directed towards the north. Those monuments were believed to contain immense riches.....*

This fragment was translated from the *Coptic*, or ancient Egyptian language into Arabic. And since the astronomical epochs; recorded in this book, have been examined and compared, it has been found, that from the foundation of the py-

* Koroures, according to our manuscript. (L-s.)

† Ezeje, an arched subterraneous gallery. (L-s.)

|| Mouzer does not appear to me a particular denomination. But I believe that it should be pronounced *Mouezzer* (the two words are written alike), and translated, the pyramid covered with a garment. This pyramid, which our author says is the least, is probably overlaid with marble. See the inscription which I have above inserted, page 400. (L-s.)

ramids, there have elapsed 4331 years. It was then enquired, What number of years had lapsed from the *Thoufan* (the deluge), and this period was found to be 3941 years. Thus this book informs us, that the pyramids were constructed 390 years before the deluge; but the truth of this is only known to God and his prophet.

One of the wonderful things in Egypt is the statue named Aboyl-houla* (the sphinx). This monument, which represents the image of a human head, is situated near the pyramids, where it appears half out of the ground. It serves as a talisman against the sands, to hinder them from penetrating into the country of Jizeh.

There is also in Egypt a remarkable fountain, bearing the name of Nathoul. Its source is in a deep cavern, from the roof of which it falls in drops like rain, and carries along with it a slime, which adhering to its sides, is there inspissated, and produces rats, mice, and other impure animals.

Mount Mokatham extends along Egypt, from Soueys (Suez), and runs parallel to the course of

* Abou-el-houl (the Father of Terror) on account of the monstrous figure of that colossus. It was anciently called Belhit, according to Al-Makrify, who gives no explanation of this name. (L--s.)

the Nile as far as the country of the Ethiopians*. It produces neither plants nor trees, nor potable water, except from a little fountain, rather bitter and brackish, at a christian monastery.

It has been pretended, that this mountain formerly contained a mine of emeralds. At present are found there a great number of mummies, or dead bodies dried and preserved in the sand, like those which are taken out of the wells of *Sakarah* †, in the plain of the pyramids.

* Our manuscript adds, “ That it commands the mountain Karafah, (near to Cairo, and famous for its observatory) and that mosques and chapels have been built on its summit.” (L—s.)

† Read Sakharah, that is to say, the rock. In fact, the bottom of this plain is a rock covered with some feet of sand. See the *Description of the Plains of Heliopolis and Memphis*, by Fourmont, p. 220. This last member of the phrase is not in our manuscript. I conjecture, that it has been added by citizen Marcel; to give greater perspicuity to his translation. (L—s.)

DISCOURSE

Of CITIZEN DENON,

*To be read at the Institute of Cairo, on his Return
from Upper Egypt.*

Citizen President,

YOU have told me, that the Institute expected me to give an account of my journey into Upper Egypt, by reading to them, at their different meetings, the journal which I should have joined to the drawings which I have brought with me. The earnest desire I feel to fulfil the request of the Institute, will induce me to hasten the arrangement of the notes which I took, with no other pretension than that of not neglecting any object that was daily presented to my curiosity, thinking that every thing was curious in a country altogether new to Europe: and that, at my return, every one would be asking me for some account of the object of his personal curiosity. I had in view objects of every kind; and if I am afraid, in this place, of tiring those to whom I shew the number of my productions, because I exhibit to them things which they have daily

under their eyes ; when arrived in France, I shall perhaps, reproach myself for not having multiplied them still more, or rather I shall regret, that circumstances allowed me neither sufficient time nor opportunity. If my zeal has put into action all my resources, they have been seconded and supported with all the assistance which I could expect from the Commander in Chief, whose vast conceptions do not make him forget details. Knowing that the object of my journey was to visit the monuments of Upper Egypt, he sent me with the division appointed to make the conquest of it. In General Desaix, I found a man learned, curious, and friendly to the arts. I received from him all the civilities which circumstances would permit. With General Beliard I experienced equality, friendship, and unaltered attention ; good nature on the part of the officers ; and a cordial wish to oblige, in all the soldiers of the twenty-first demi-brigade. In short, I so identified myself with the battalion which it formed, and which was become my ordinary abode, that I forgot I was on a warlike expedition, or that war was foreign to my occupations.

Having to pursue an enemy always on horseback, the movements of the division were numerous

merous and unforeseen. Forced to pass rapidly the most interesting monuments, and to stop where there was nothing worthy of observation ; if, in my nullity, I sometimes felt the fatigue of unprofitable marches, I also experienced that it is frequently advantageous to take a first glance of great objects, before detailing them ; that dazzled by their number, they may not class themselves in the mind by mere reflection ; that, if we must carefully preserve the first impressions, it is only in the absence of the objects which first gave them birth, that we can analyze them, judge of them, adopt them. I have also thought, that a travelling artist, when entering on a journey, ought to leave behind him all partiality to his profession ; that it is not that which would make a fine drawing, which ought to occupy him, but that curiosity should inspire the aspect of the place which he has to delineate. I have already received my recompense for abandoning this partiality, in the complaisant curiosity which you, Citizen, have manifested to observe with avidity, even the least among the immense number of designs which I have brought hither, designs which I most commonly sketched upon my knee, in a standing posture, and even on horse-

back ; having never been able to finish a single one to my mind, nor once, for a whole year, to procure a table sufficiently plain to allow me the use of a ruler.

It was, therefore, with a view to answer your questions, that I sketched this multitude of designs, frequently on too small a scale, because our marches were too precipitate to attempt the details of objects, of which it was my wish to present you, both with a just and general view. In this manner, I took in a mass the pyramids of Sakhourah, the situation of which I traversed at full gallop, in my way to Beneçouef, in the mud houses of which I remained for a month. This time I employed in comparing the characters, and in designing the figures and the dress, of the different nations who now inhabit Egypt ; their manufactures, and the relative situations of their villages.

At last I saw the portico of Hermopolis ; and the great masses of its ruins, gave me the first image of the colossal Egyptian architecture. Every rock which composed this edifice appeared, in my eye, as if inscribed POSTERITY, ETERNITY.

Soon after Denderah (*Tentyris*), taught me,
that

that it is not in the Doric, Ionic, and Corinthian orders alone, that we must seek the beauties of architecture; and that beauty exists wherever harmony of parts is found. The morning brought me to its edifices, and the evening tore me from them, rather agitated than satisfied. I saw a hundred things, while a thousand escaped me. I was, for the first time, introduced to the archives of the arts and sciences. I had a presentiment that I should see nothing more beautiful in Egypt; and twenty journeys, which I have made to Denderah, have only confirmed me in this opinion. The arts and sciences, united by good taste, have decorated the temple of Isis. Astronomy, morality, and metaphysics, have here bodily forms, which decorate the ceilings, the frizes, and the pedestals, with as much taste and grace, as our poor, insignificant Arabesque imitations give to our closets.

We continually advanced. I will confess that a thousand times I dreaded that Mourad, tired of fleeing before us, would surrender himself, or hazard a decisive battle. I thought that that of Samhout would give him the finishing blow; but instead of fighting us, he thought that the desert would be more fatal to us than his arms;

and an opportunity of destroying him still eluded Desaix, while I entertained the hope of pursuing him beyond the tropic.

We approached *Thebes*—Thebes, the very name of which excites the recollection of great ideas. As if it had been possible that it could escape me, I delineated it at as great a distance as I could perceive it ; and as I made this design, I indulged the hope, that you would one day participate the sentiment by which I was animated. We were obliged to traverse it rapidly, and scarcely had I viewed it a moment, when I was forced to quit it.

There was a colossus which could only be measured by the eye, and by the astonishment which it occasioned. On the right were embowelled and sculptured mountains ; on the left, temples, which, at more than a league's distance, appeared like other rocks ; and palaces, like other temples, from which I was snatched. I turned round mechanically to seek for the hundred gates, a poetic expression, by which Homer intended to paint, in a single word, this superb city, loading the earth with the weight of its porticoes, and so large, that Egypt could scarcely contain its extent. Seven journeys have not satisfied the curiosity

curiosity excited by the first ; and it was not before the fourth, that I reached the other bank of the river.

Farther on, *Hermontis* would have appeared superb, if I had not found it almost at the gates of Thebes.

The temple of *Eshé*, the ancient *Latopolis*, appeared to me the perfection of Egyptian art, one of the finest productions of antiquity. That of *Edsou*, or *Apollinopolis magna*, is one of the largest, best preserved, and best situated of all the Egyptian monuments. In its present state, it appeared like a fortress commanding the town.

There the destiny of my journey was decided, and we proceeded irrevocably on our way to Syene (*Eçouan*). In traversing those deserts, I, for the first time, became sensible of the weight of years, which I had not reckoned, when I engaged in this expedition : my courage, rather than my strength carried me through. There I quitted the army, to remain with the demi-brigade which was posted to confine Mourad to the desert. Proud of finding my country possess the same boundary with the Roman empire, I occupied with glory the same quarters, with the three cohorts which had formerly defended it. During the

the two and twenty days that I remained in this celebrated station, I took possession of all the environs. I pushed my conquests even into Nubia, beyond *Philé*, a delightful island, the curiosities of which must still be snatched from the savage inhabitants. Six days march, and five days of siege, at last opened to me its temples. Feeling all the importance of describing to you the place which I now inhabited, all the curiosities which it contained, and which it would yield to you, I delineated even the rocks and quarries of granite, from whence proceeded those colossal figures, those obelisks still more colossal, those rocks covered with hieroglyphics. It was my wish to give you the forms, and the very patterns of every thing interesting, which I saw. Not being able to give a chart of the country, I made a bird's eye sketch of the entry of the Nile into Egypt, and took views of that river rolling its waters, among pointed rocks of granite, which seem to have marked the limits of the burning Ethiopia, and of a country more happy, and more temperate. Leaving for ever those rugged countries, I returned towards the verdant Elephantina, the garden of the tropic. I searched, I measured all the monuments preserved in it, and

and I quitted with regret that peaceful retreat, where agreeable occupations had restored me to health and strength.

On the right bank of the Nile, I found *Ombos*, the town of the crocodile, and that of Juno *Lucina*, *Coptos*, near to which I was under the necessity of defending the riches which I was bringing away, from the atrocious fanaticism of the *Mekyns*.

When fixed at *Kené*, I went with those who crossed the desert to *Kosseir*, in order to put a stop to new emigrations from Arabia. I saw what may be called a breach of the chain of *Mokatham*, the sterile borders of the red sea. I became acquainted with, and respected that patient animal, which nature seems to have placed in this region, as a reparation for her error in making a desert. I then returned to *Kené*, from whence I successively revisited *Edfou*, *Esné*, *Hermontis*, *Thebes*, *Dendera*; and *Edfou* and *Thebes* again. In short, I accompanied every party which was detached, in every direction: and, if the love of antiquity often made me a soldier, the respect of the soldiers for my researches, often made them antiquaries. In these last excursions, I visited

I visited the tombs of the kings; and in those mysterious depositaries, I acquired an idea of the art of painting among the Egyptians, of their arms, their furniture, their utensils, their instruments of music, their ceremonies, and their triumphs. In these last journeys too, I came to be convinced, that hieroglyphics engraved upon walls were not the only books of that learned people. After having found in *baso-relievo*, persons in the act of writing, I additionally discovered that roll of *papyrus*, that extraordinary manuscript, which hath already been made the object of your curiosity: frail rival of the pyramids, precious pledge of a preservative climate, monument respected by time, and which forty centuries place in the rank of the most ancient of books!

In these last excursions, I endeavoured by my researches, to complete the voluminous collection of hieroglyphic drawings. It was in thinking of you, Citizen, and all the learned in Europe, that I found courage to copy, with scrupulous exactness, the minute details of dry figures of which I did not understand the sense, and could not avail myself of the assistance of your learning.

At

At my return, Citizen, loaded with my labours, the weight of which was daily increasing, I forgot the fatigue of them, when I reflected that they were performed under your eye, helped forward by your advice, and that I might one day render them useful to my country, and not unworthy of being laid before you.

FINIS.

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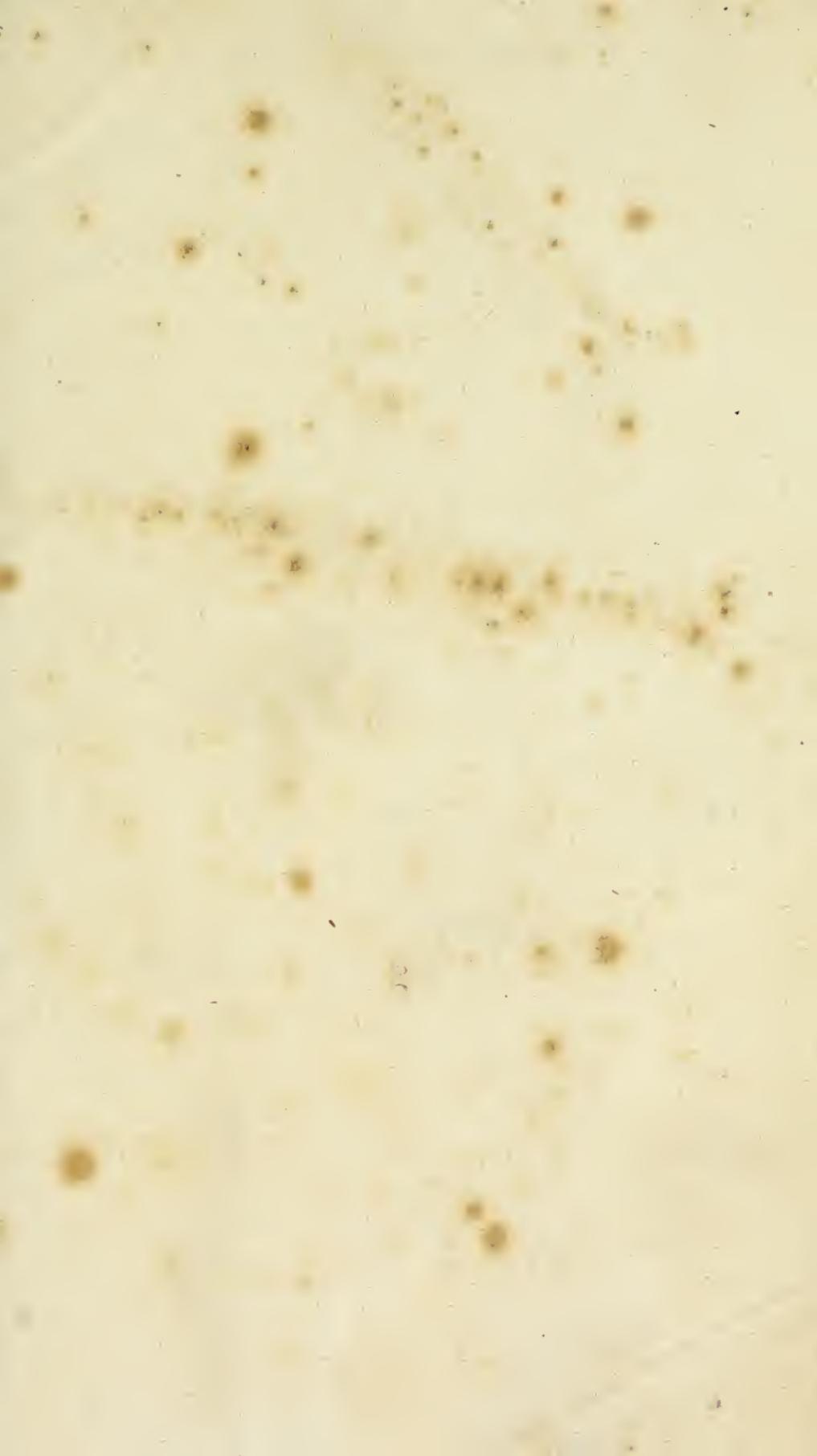
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